Industrial Bar Code Printers

SATO M-8400RV
Service Manual

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Rev C

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Warning: This equipment complies with the requirements in Part 15 of FCC rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

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Rev C

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Section 1

Overview and Specifications

1-1 Overview

The SATO M-8400RV Printer Service Manual provides information for installing and maintaining the M-8400RV printer. Step-by-step maintenance instructions are included in this manual with typical problems and solutions. It is recommended that you become familiar with each section in this manual before installing and maintaining the printer.

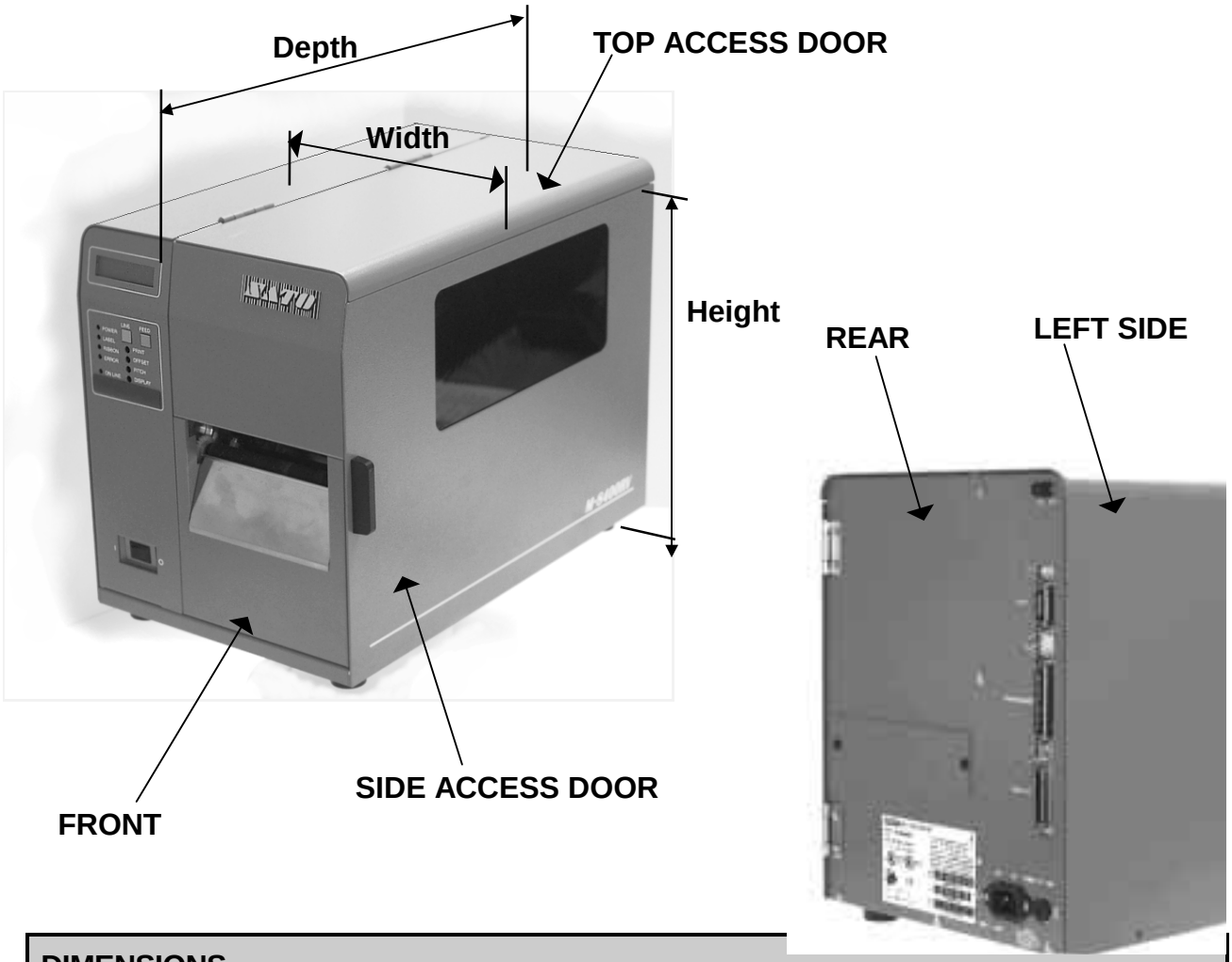
The M-8400RV printer has a resolution of 203 dpi and can print labels up to four inches wide. It uses the standard SATO RISC printer command codes and the only difference between it and other RISC printers are the allowable values representing the print positions on the label. These values are specified in "dots" and will vary depending upon the resolution of the printer and the amount of memory available for imaging the label. The allowable range for the M-8400RV is specified in a table for those command codes.

The M-8400RV is compatible with the standard M-8400. The main difference is how it receives the command sequence and how it responds to certain commands. Refer to the "Operator and Technical Reference Manual" for other information.

This manual is divided into the following nine sections:

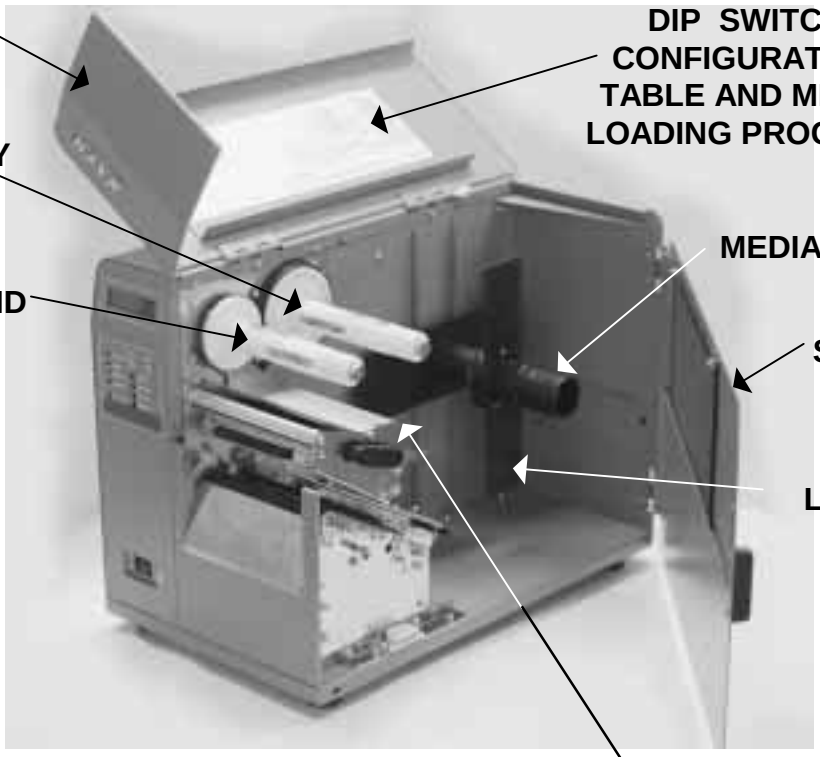
- *SECTION 1 - OVERVIEW AND SPECIFICATIONS*
- *SECTION 2 - CONFIGURATION*
- *SECTION 3 - INTERFACE SPECIFICATIONS*
- *SECTION 4 - ELECTRICAL CHECKS AND ADJUSTMENTS*
- *SECTION 5- MECHANICAL ADJUSTMENTS*
- *SECTION 6 - REPLACEMENT PROCEDURES*
- *SECTION 7 - FACTORY RESETS*
- *SECTION 8 - TROUBLESHOOTING*
- *SECTION 9 - OPTIONS*

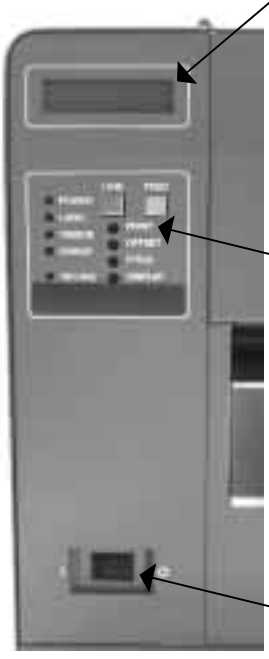
1-2 Physical Characteristics

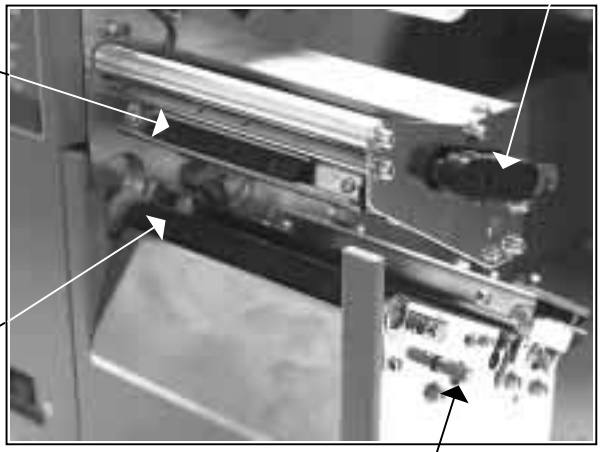


DIMENSIONS	
Width	10.4 in. (265 mm)
Depth	17 in. (430 mm)
Height	13.5 in. (341 mm)
Weight	40 lbs (18 Kg)
POWER REQUIREMENTS	
Voltage	100 - 115 V (+/- 10 %) 220 V (+/- 10 %) 50/60 Hz (+/- 1%)
Power Consumption	50 Watts Idle 130 Watts Operating

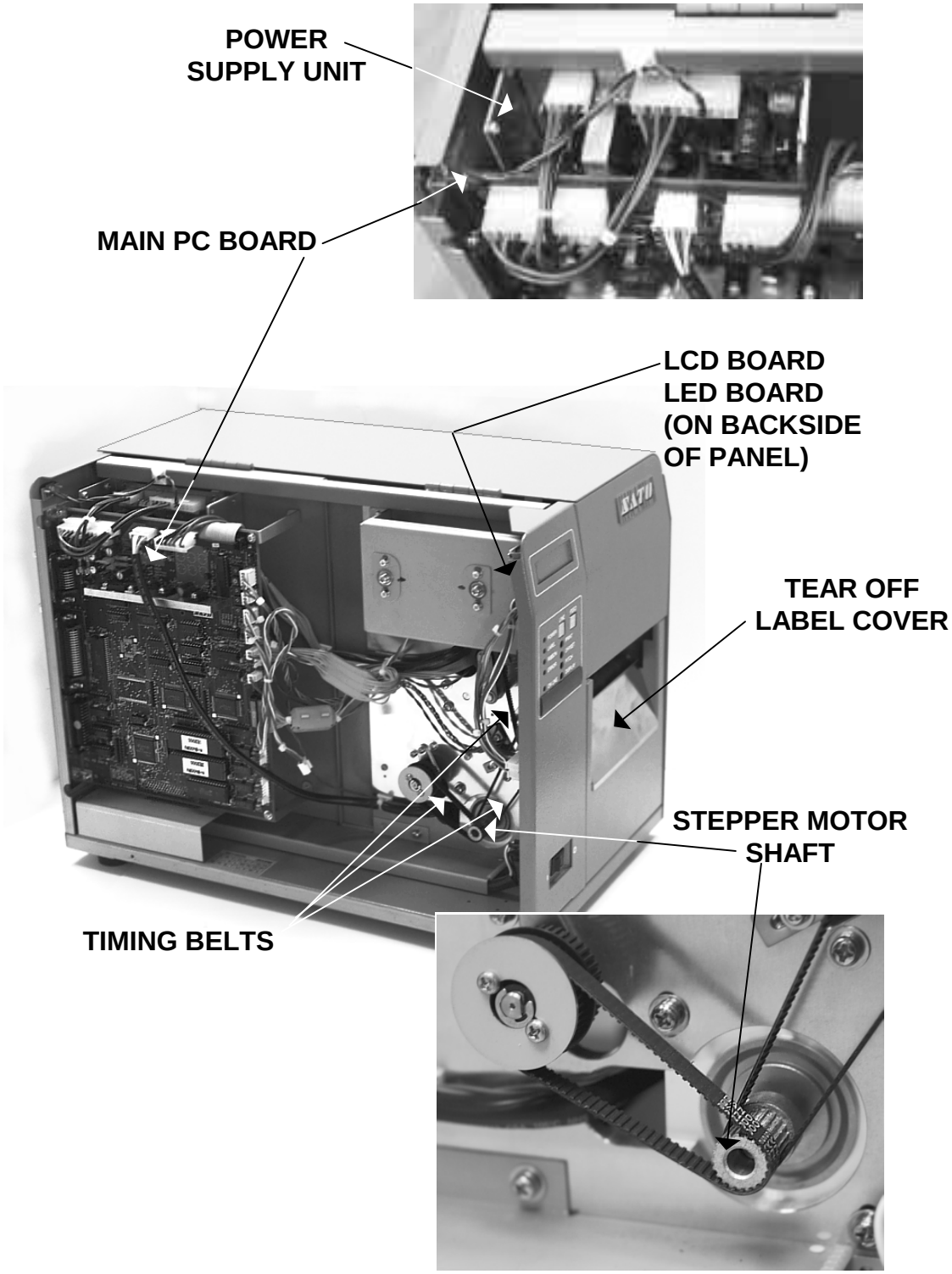
1-3 Components







1-3 Components



1-4 Ribbon

Use only SATO thermal transfer ribbons which were formulated expressly for use in all SATO printers. Use of other than approved ribbons may result in unsatisfactory print quality and/or damage to the print head and may void your warranty.

1-5 Installation Considerations

Printer operation can be affected by the printer environment. The location of the printer should be free from dust, humidity, and sudden vibrations. To obtain optimum results from the printer, avoid locations influenced by:

- Direct or bright sunlight since bright light will make the label sensor less responsive and may cause the label to be sensed incorrectly.
- Warm temperatures which can cause electrical problems within the printer. (See Section 3, Specifications.)

1-6 Interface Connections (Rear Panel)

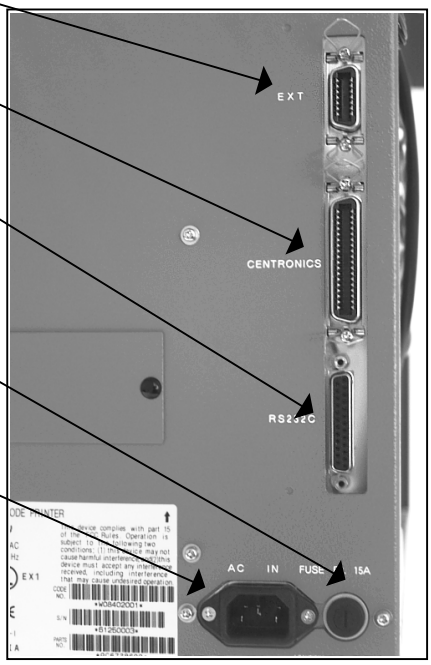
EXT. PORT CONNECTOR: External signal connector.

CENTRONICS CONNECTOR: Printer using parallel communication connection.

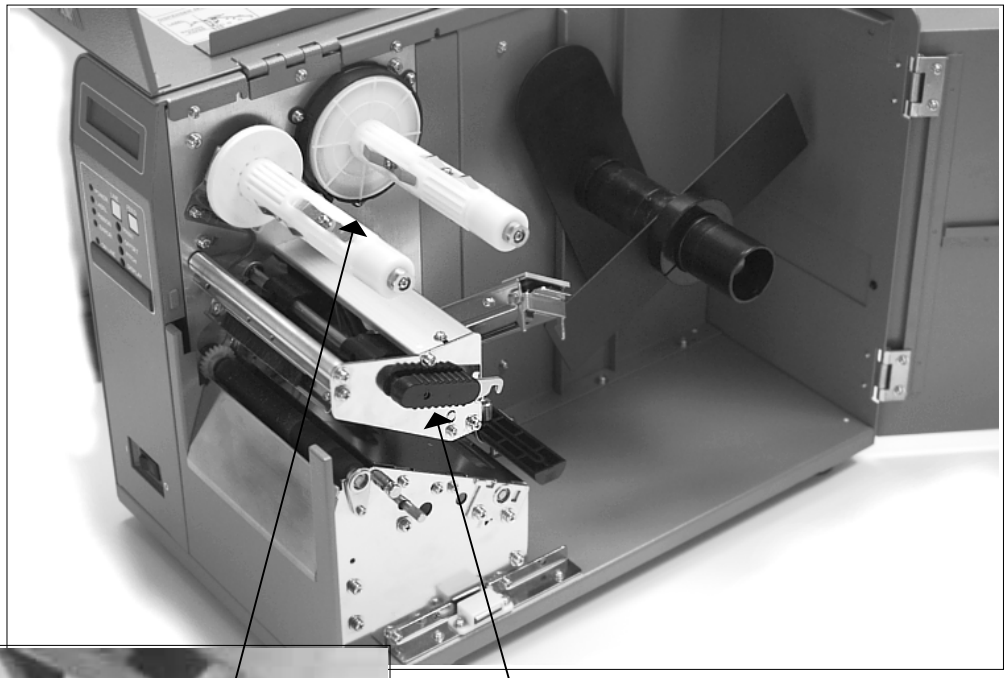
RS232 CONNECTOR: Printer using serial communication connection.

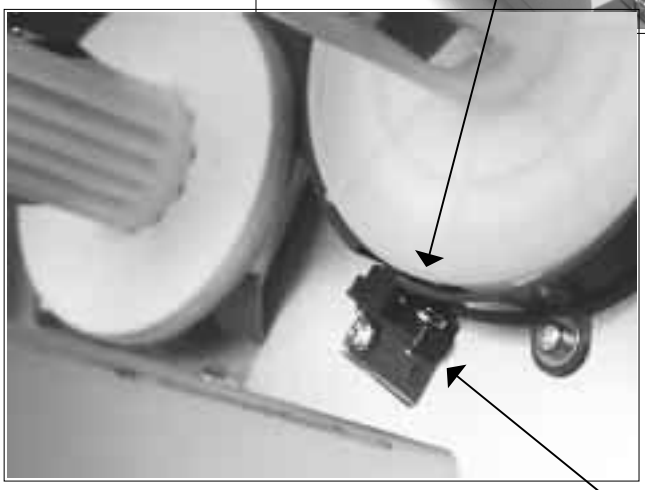
AC FUSE: To protect the machine from abnormal power input. Type 3A/250V

AC INPUT CONNECTOR: Connect to 115V 50/60 Hz. with cable provided.



1-7 Switches and Sensors

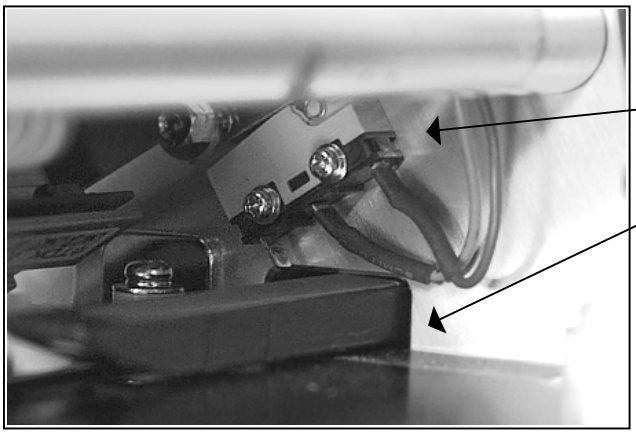




HEAD LATCH LEVER: When the print head is opened, a micro switch is activated and the printer will stop printing. Error message will be displayed on the LED operator panel.

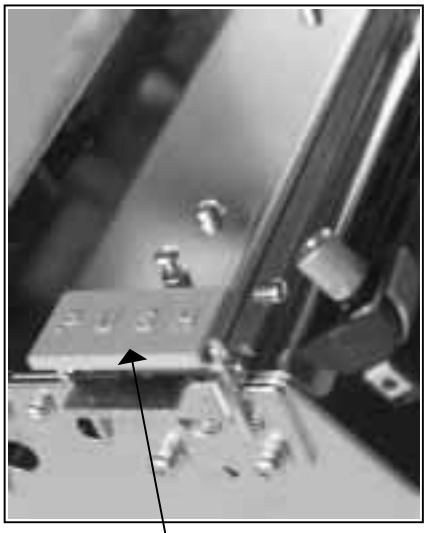
RIBBON SENSOR: The sensor will react to the ribbon unwind when approximately 45 feet of ribbon remains. This sensor is a motion detector that signals the printer when the ribbon supply is turning. This sensor is used for both the ribbon end and ribbon rear end sensing. When error is displayed: Ribbon out, not turning.

1-7 Switches and Sensors (Cont.)

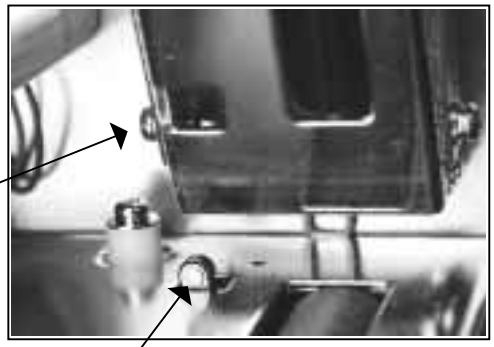


MICRO SWITCH

LABEL SENSOR UNIT: Both the "I"- Mark (reflective), and Gap (transmissive) sensors can be adjusted over a limited range. They are both located in the label sensor unit. The assembly can be adjusted by loosening the green sensor adjust knob located underneath the label transport assembly and sliding the label sensor unit to the desired position. The gap sensor can be adjusted from a minimum of 0.67 in. (17mm) to a maximum of 2.5 in. (64 mm), and the "I"- Mark" from a minimum of 0.25 in. (7 mm) to a maximum of 2.1 in. (54 mm) from the fixed position, inside label guide.
The range of sensor adjustment can be increased to allow the Gap sensor to be positioned as close as 3mm from the inside label edge. Refer to Section 5.8.



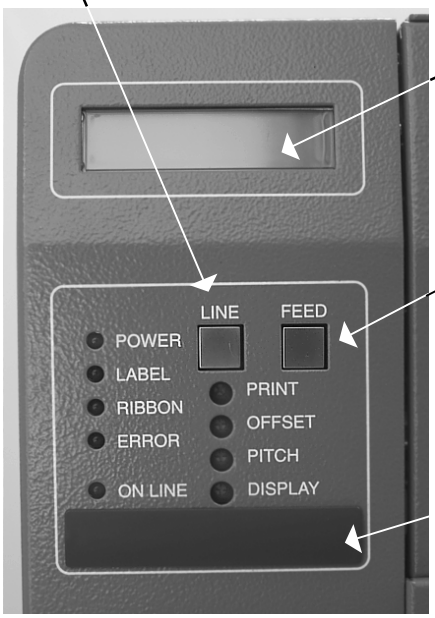
MEDIA HOLD DOWN:
Open by lifting up on the release tab underneath the green tab marked "PUSH".
Close by pushing down on the same green tab.



LABEL OUT SENSOR: Micro switch is activated when media stock is out or when the Media Hold Down is in the up position. All printer operations stop and an error message is displayed on the LED.

1-8 Operator Panel / Displays

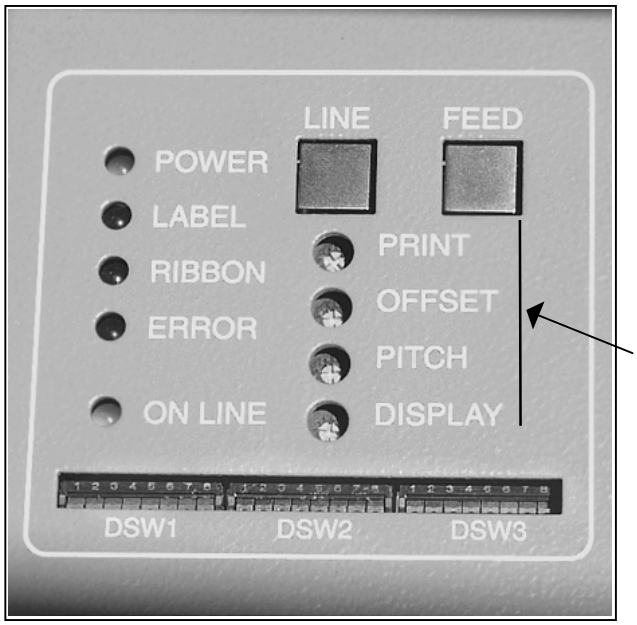
LINE Key: Momentary switch. Pressing this key toggles the printer between the on-line and off-line mode. When the printer is on-line, it is ready to receive data from the host. This key acts as a pause during a print job by taking the printer off-line. It can also be used as a pause function key to stop the printer during the printing process.



LCD SCREEN: 2 Line x 16 Character LCD display. Used for setting operational parameters of the printer and displaying error conditions.

FEED Key: Momentary switch. Pressing this key feeds one blank label through the printer when it is off-line. When the printer is on-line, another copy of the last label will be printed.

DIP SWITCH COVER



FINE TUNING - USE SOFTWARE FIRST

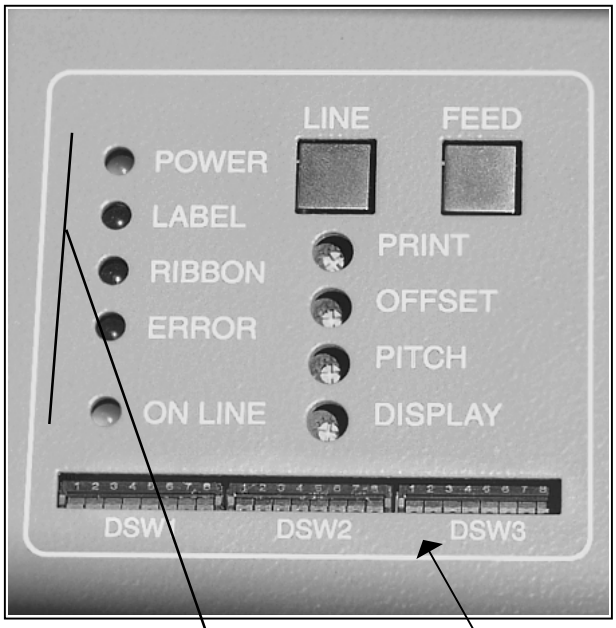
PRINT POTENTIOMETER: To adjust print darkness (fine adjustment).

OFFSET POTENTIOMETER: To adjust back/forward feed for dispenser/cutter/tear - bar position (+/- 3.75mm).

PITCH POTENTIOMETER: Adjusts home position of the label(+/- 3.75mm). Affects stop position of label feed, print position, and dispense position.

DISPLAY POTENTIOMETER: Used to adjust the lighting intensity (contrast) of the LED'S.

1-8 Operator Panel / Displays (Cont.)



DSW1, 2 & 3: DIP Switches used to set operational parameters of printer. Refer to Section 2 for settings.

	LED'S: - STATUS INDICATORS
POWER	LED, illuminated when the power is on.
LABEL	LED, illuminated when label supply is out.
RIBBON	LED, illuminated when ribbon motion sensor does not detect any ribbon motion (ribbon out).
ERROR	LED, illuminated when there is a system fault such as an open print head.
ON LINE	LED, illuminated when printer is ready to receive data. Turn ON/OFF by toggling the LINE key.

1-9 Optional Accessories

ACCESSORIES	Refer to Section 9 for installation instructions.
Memory Expansion	Two slots for PCMCIA Memory Cards (up to 2MB each) that can be used for Graphic File storage, print buffer expansion, format storage and downloaded TrueType font storage.
Label Dispenser	Internal attachment allowing labels to be peeled from backing for immediate (on demand) application. Backing is not rewound.
Label Rewinder	External option rewinds labels onto a roll after they are printed.
Label Cutter	Internal attachment allowing labels to be cut at specified internals. Controlled through programming.
Real Time Clock & Calendar	An internally mounted Date/Time clock that can be used to date/time stamp labels at the time of printing.
Coax/Twinax Interface	Coax/Triax Adapter. Coax I/F emulates an IBM 3287-2 printer with a standard Type A BNC connector. Twinax I/F emulates IBM 5224, 5225, 5226 or 4214 printer with auto-terminate/cable-through capabilities.

1-10 Environment & Approvals

ENVIRONMENTAL	
Operating Temperature	41^0 to 104^0F (5^0 to 40^0C)
Storage Temperature	-0^0 to 104^0F (-20^0 to 40^0C)
Operating Humidity	15-85 % RH, non-condensing
Storage Humidity	Max 90% RH, non-condensing
Electrostatic Discharge	8KV
REGULATORY APPROVALS	
Safety	UL, CSA
RFI/EMI	FCC Class A

1-11 Print

PRINT	
Method	Direct or Thermal Transfer
Speed (User Selectable)	2 to 10 ips 50 to 250 mm/s
Print Module (Dot Size)	.0049 in. .125 mm
Resolution	203 dpi 8 dpmm
Maximum Print Width	4.1 in. 104 mm
Maximum Print Length (Expanded Print Length)	14 in. 356 mm
Maximum Print Length with 2MB Memory Card	49.5 in. 1249 mm

1-12 Media, Sensing, and Ribbon

MEDIA	
Minimum/Maximum Width	.87 in to 5.0 in. (22 mm to 128 mm)
Minimum/Maximum Length	.5 in. to 19.7 in. (12.7 mm to 500 mm)
Type	Die Cut Labels, Fan Fold, Tag Stock or Continuous
Caliper (thickness)	Maximum .010 in. (.25 mm) including backing paper
Roll OD (max)	8.6 in. (218 mm), Face-In Wind
Core ID (min)	1.5 in. (38 mm)
Core ID (Recommended)	3 in. (76 mm)

1-12 Media, Sensing, and Ribbon

SENSING	
See-Thru for labels or tags	Movable
Reflective “I- Mark”	Movable
Continuous Form	Sensor not used (Software Controlled)
RIBBON	
Maximum Width	4.4 in. (111 mm)
Length	1475 ft. (450 m)
Thickness	4.5 micron, Face-In Wind

1-13 Controls and Signals, Adjustments

CONTROLS AND SIGNALS	
On-Line	Green LED
Power	Green LED
Label	Red LED
Ribbon	Red LED
Error	Red LED
LCD Panel	2 Line x 16 Character
On/Off-Line Switch	Front Panel
Label Feed Switch	Front Panel
Power On/Off Switch	Front Panel
POTENTIOMETER ADJUSTMENTS	
Print Darkness	Front Panel
Pitch	Front Panel
Offset	Front Panel
Display	Front Panel

1-14 Interface Connections

INTERFACE CONNECTIONS	
Parallel (Amp 36 pin)	Centronics Compatible Standard
Serial (DB25S)	RS232C (2400 to 19.2K bps) Standard
Serial Protocol	Hardware Flow Control (Ready/Busy) Software Flow Control (X-On/X-Off) Bi-directional (ENQ/Response)
Data Transmission	ASCII Format

1-15 Processing

PROCESSING	
CPU	32 BIT RISC
ROM	1 Mbyte (4 M bit x 2)
DRAM	2 MByte

1-16 Character Fonts

MATRIX FONTS	
U Font	(5 dots W x 9 dots H)
S Font	(17 dots W x 17 dots H)
M Font	(24 dots W x 24 dots H)
XU Font	(5 dots W x 9 dots H) Helvetica
XS Font	(17 dots W x 17 dots H) Univers Condensed Bold
XM Font	(24 dots W x 24 dots H) Univers Condensed Bold
OA Font	(15 dots W x 22 dots H) OCR-A
OB Font	(20 dots W x 24 dots H) OCR-B

1-16 Character Fonts

AUTO SMOOTHING FONTS	
WB	WB Font (18 dots W x 30 dots H) Univers Condensed Bold
WL	WL Font (28 dots W x 52 dots H) Sans Serif
XB	XB Font (48 dots W x 48 dots H) Univers Condensed Bold
XL	XL Font (48 dots W x 48 dots H) Sans Serif
VECTOR FONT	
Helvetica Bold	Proportional or Fixed Spacing Font Size 50 x 50 dots to 999 x 999 dots 10 Font Variations
DOWNLOADABLE FONTS	
	TrueType Fonts (Storage requires Optional Memory Expansion)
CHARACTER CONTROL	
	Expansion up to 12x in either the X or Y coordinates Character Pitch Control, 0 to 99 dots Line Space Control, 0 to 99 dots Journal Print facility 0^0, 90^0 ,180^0 and 270^0 Rotation

1-17 Bar Codes and Other Features

SYMBOLOGIES	
	Bookland (UPC/EAN Supplemental) EAN-8, EAN-13 UPC-A and UPC-E CODABAR Code 39 Code 93 Code 128 Interleaved 2 of 5 Industrial 2 of 5 Matrix 2 of 5 MSI POSTNET UCC/EAN-128 Data Matrix Maxicode PDF417
Ratios (where appropriate)	2:1, 3:1, 5:2 User definable bar widths
Bar Height	4 to 600 dots, User programmable
Rotation	0^0, 90^0, 180^0 and 270^0
OTHER FEATURES	
Sequential Numbering	Sequential numbering of both numerics and bar codes
Custom Characters	RAM storage for special characters
Graphics	Full dot addressable graphics, SATO Hex/Binary or PCX formats
Form Overlay	Form overlay for high-speed editing of complex formats

Section 2

Configuration

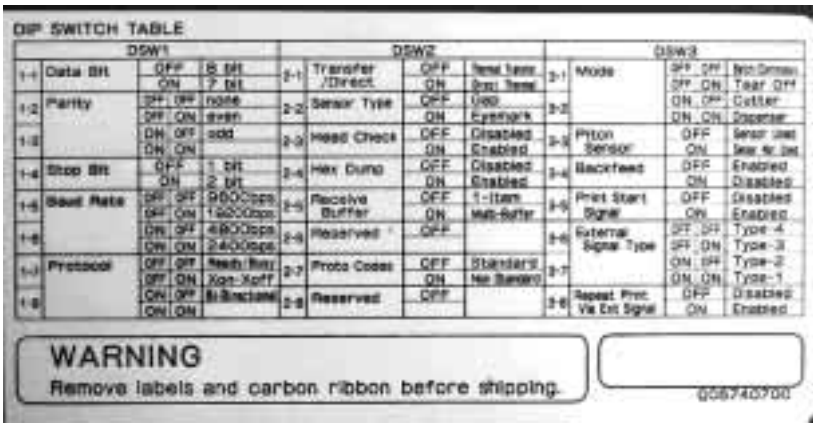
2-1 Dip Switch Settings

Three DIP switches DSW1, DSW2, and DSW3 are located underneath a snap-on cover on the operation panel. These switches can be used to set:

- *RS232C TRANSMIT/RECEIVE PARAMETERS*
- *THERMAL TRANSFER OR DIRECT THERMAL MODE*
- *LABEL SENSOR ENABLE/DISABLE*
- *HEAD CHECK MODE*
- *HEX DUMP MODE*
- *RECEIVE BUFFER SIZE*
- *OPERATION MODE*

SNAP-ON COVER SHOWN REMOVED

DIP Switch Panel



DIP SWITCH TABLE IS LOCATED ON BACK SIDE OF TOP ACCESS DOOR

2-1 Dip Switch Settings (Cont.)

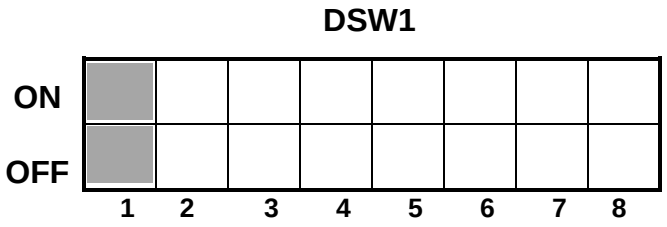
Each switch is an eight position "toggle" switch. The ON position is always to the top. To set the switches, first power the unit Off, then position the DIP switches. After placing the switches in the desired positions, power the printer back on. The switch settings are read by the printer electronics during the power up sequence. They will not become effective until the power is cycled.

RS232 Transmit/Receive Setting

Data Bit Selection (DSW1-1)

This switch sets the printer to receive either 7 or 8 bit data bits for each byte transmitted.

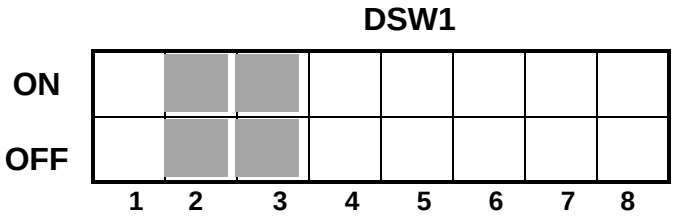
DSW1-1	SETTING
OFF	8 Data Bits
ON	7 Data Bits



Parity Selection (DSW1-2, DSW1-3)

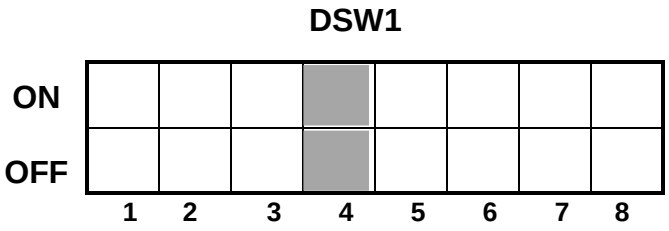
These switches select the type of parity used for error detection.

DSW1-2	DSW1-3	SETTING
OFF	OFF	No Parity
OFF	ON	Even
ON	OFF	Odd
ON	ON	Not Used



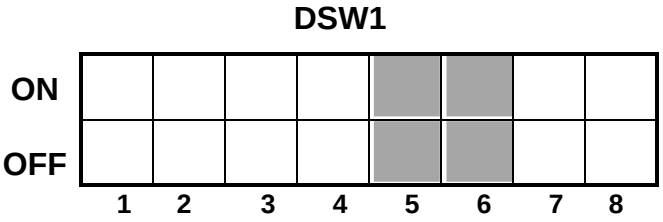
Stop Bit Selection (DSW1-4)
Selects the number of stop bits to end each byte.

DSW1-4	SETTING
OFF	1 Stop Bit
ON	2 Stop Bits



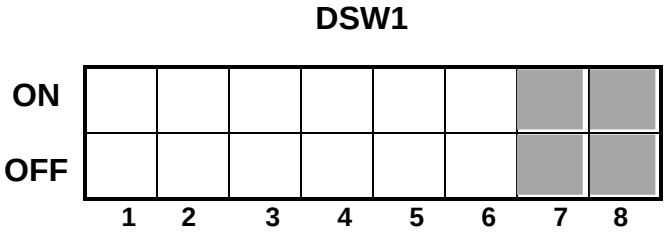
Baud Rate Selection (DSW1-5, DSW1-6)
Selects the data rate(bps) for the RS232 port.

DSW1-5	DSW1-6	SETTING
OFF	OFF	9600
OFF	ON	19200
ON	OFF	4800
ON	ON	2400



Communication Protocol Selection (DSW1-7, DSW1-8)
Selects the flow control and status reporting.

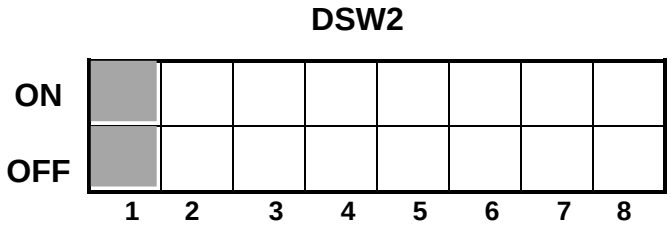
DSW1-7	DSW1-8	SETTING
OFF	OFF	Ready/Busy
OFF	ON	X-on/X-Off
ON	OFF	Bi-Directional
ON	ON	Not Used



Print Mode Selection (DSW2-1)

Selects between direct thermal printing on thermally sensitive paper and thermal transfer printing using a ribbon.

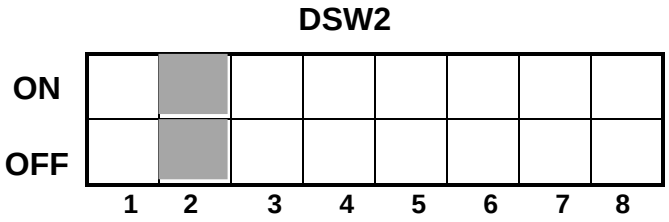
DSW2-1	SETTING
OFF	Therm Xfr
ON	Direct Therm



Sensor Type Selection (DSW2-2)

Selects between the use of a label gap or a reflective "I - Mark" detector.

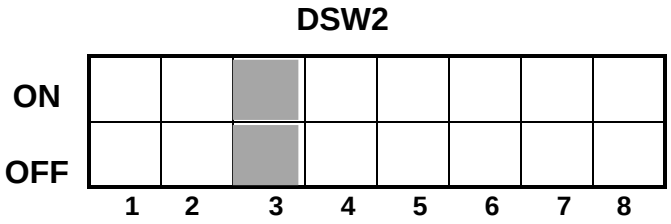
DSW2-2	SETTING
OFF	Gap
ON	"I - Mark"



Head Check Selection (DSW2-3)

When selected, the printer will check for head elements that are electrically malfunctioning.

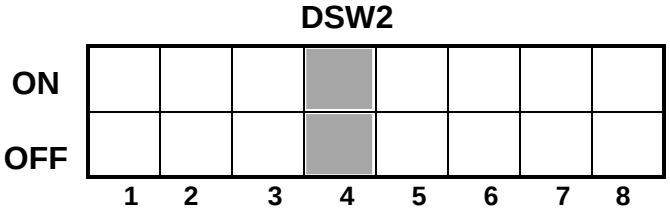
DSW2-3	SETTING
OFF	Disabled
ON	Enabled



Hex Dump Selection (DSW2-4)

Selects Hex Dump mode.

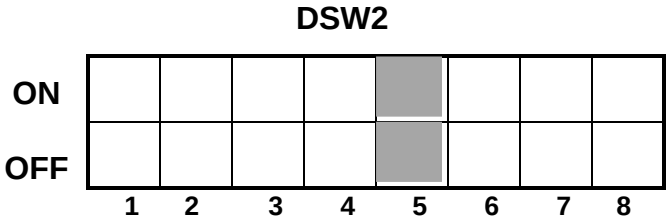
DSW2-4	SETTING
OFF	Disabled
ON	Enabled



Receive Buffer Selection (DSW2-5)

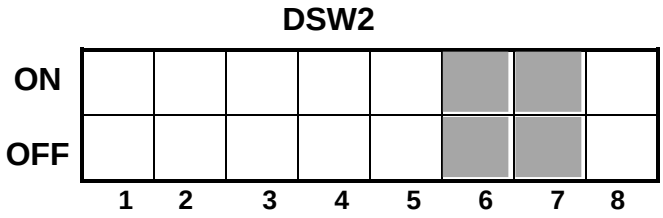
Selects the operating mode of the receive buffer.
Note: The Centronics interface operates only in the multi job buffer mode regardless of the switch setting.

DSW2-5	SETTING
OFF	Single Job
ON	Multi Job



Protocol Control Code Selection (DSW2-6 & DSW2-7)
Selects the command codes used for protocol control.

DSW2-6*	DSW2-7	SETTING
Reserved	OFF	Standard
Reserved	ON	Non-Std.



****Reserved for Future Use (DSW2-6)***

NOTE: The Centronics (Parallel) communications port on the M8400RV is always enabled regardless of the settings for the RS232 port. There are no settings for Centronics. Both the Centronics and the RS232 ports are active at all times. Care should be taken to ensure that data is not transmitted to both ports simultaneously, as the received message will be corrupted.

Selecting Protocol Control Codes

Protocol control codes are used to tell the printer that a specific type of information is being transmitted to the printer. As an example, the Standard Protocol Command Code specifies the use of an <ESC> character to tell the printer that the following character(s) will represent a specific command. Sometimes the host computer is unable to generate the character or it uses the <ESC> character to control another function. In this case, an Alternate Protocol Command Code set can be selected for use by placing DIP switch 2-7 in the ON position. When the Alternate set is selected, The <ESC> character is not used and is instead replaced with a "carrot" (^) character. A command stream would then start with an "^A" instead of an "<ESC>A". These two sets of Protocol Command Codes are adequate for the majority of all applications, but occasionally situations occur where conflicts exist when using the Alternate set. In these cases, the user can define and download a custom set of Protocol Command Codes that are stored in EEPROM memory in the printer. After these are downloaded, they replace the Alternate Command Code set when DIP switch DSW2-7 is in the ON position. When DIP switch DSW2-7 is in the OFF position, the Standard Protocol Command Codes are used.

Selecting Protocol Control Codes (Cont.)

Download Command Structure

The command for downloading a new set of Protocol Command Codes takes the form of <ESC>LD,a,b,c,d,e,f,g,h,i. The parameters specified for "a" through "i" can be transmitted in either ASCII characters or hex notation, allowing a complete 128 character (except for the ",") set to be used for selecting the custom code.

PARAMETER	STANDARD SETTING	ALTERNATE SETTING(DEFAULT)
a	STX	{
b	ETX	}
c	ESC	^
d	ENQ	@
e	CAN	!
f	~	~
g	OFFLINE	]
h (Auto ONLINE)	No	0 = YES 1 = NO
i (Zero Slash)	No	0 = YES 1 = NO

Reset

```
ALT.PROTOCOL
DEFAULT COMPLETE
```

If the custom Protocol Command codes are incorrect or if the printer does not respond to commands using the custom set, the Alternate Protocol Control Codes can be restored by the following procedure:

STEP	PROCEDURE
1.	Turn the printer off.
2.	Place DIP switch **DSW2-7** in the **ON** position.
3.	Turn power on while simultaneously pressing the FEED and LINE switches.

Selecting Protocol Control Codes (Cont.)

Download Procedure

The procedure for downloading a custom Protocol Command Code set is:

STEP	PROCEDURE
1.	Reset the printer to the default settings using the Reset procedure.
2.	Place DIP switch **DSW2-7** in the **ON** position.
3.	Turn power **ON** while simultaneously pressing the **LINE** switch. This places the printer in the USER DOWNLOAD mode as signified by USER DOWNLOAD displayed on the LCD panel. For printers that do not have an LCD panel, you will hear a single "beep" signifying the printer is in the USER DOWNLOAD mode.
4.	Set DIP switch **DSW2-7** in the position to accept the Protocol Control codes to be used for downloading (i.e. **DSW2-7** = **OFF** for Standard codes and **DSW2-7** =**ON** to use the Alternate set).
5.	Press the **LINE** key to place the printer in the **ON-LINE** mode. The printer is ready to receive the download command data stream.
6.	After the command has been sent, the unit will beep and print a status label. If it does not beep and print the label, the printer did not accept the data.
7.	If the printer does not beep and print a setting label, turn the printer off, check your download command stream for errors and start the download process over at step 1.
8.	If custom codes are correct, press the **FEED** key to accept them and terminate the download process. If they are incorrect, turn the unit off without pressing the **FEED** key and begin the download process again at step 1.

Selecting Protocol Control Codes (Cont.)

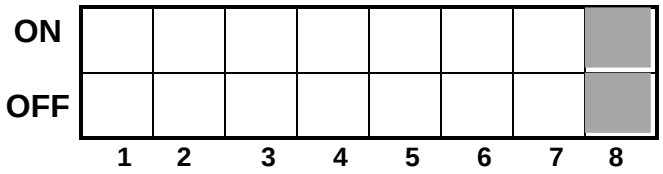
CONTROL CHARACTER	STANDARD DSW2-7 OFF	NON-STANDARD DSW2-7 ON	DESCRIPTION
STX	02 Hex	7B Hex = {	Start of Data
ETX	03 Hex	7D Hex = }	End of Data
ESC	1B Hex	5E Hex = ^	Command code to follow
Null	7E Hex	7E Hex = ~	Cutter command
ENQ	05 Hex	40 Hex = @	Get printer status, Bi-Com mode
Can	18 Hex	21 Hex = !	Cancel print job, Bi Com mode
Off-Line	40 Hex	5D Hex =]	Take printer Off-Line

M84XX Compatibility (DS2-8)

For emulating M8400 software. Should be used only if problems are encountered when using existing M8400 software.

DSW2-8	SETTING
OFF	OFF (Normal Operation)
ON	M-8400 Compatibility

DSW2

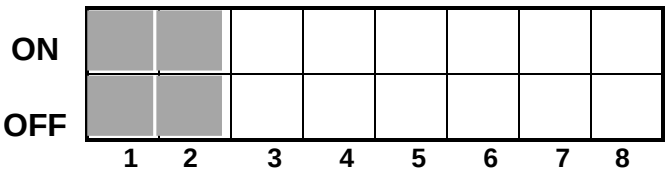


Mode Selection (DSW3-1 and DSW3-2)

Selects the operating mode of the printer.

DSW3-1	DSW3-2	SETTING
OFF	OFF	Batch/Continuous
OFF	ON	Tear Off
ON	OFF	Cutter
ON	ON	Dispenser

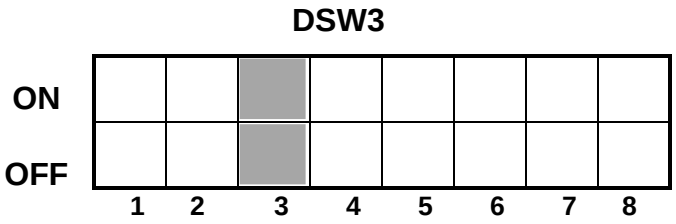
DSW3



Label Sensor Selection (DSW3-3)

Enables or disables the Label Sensor. If the Sensor is enabled, it will detect the edge of the label and position it automatically. If it is disabled, the positioning must be under software control using Line Feed commands.

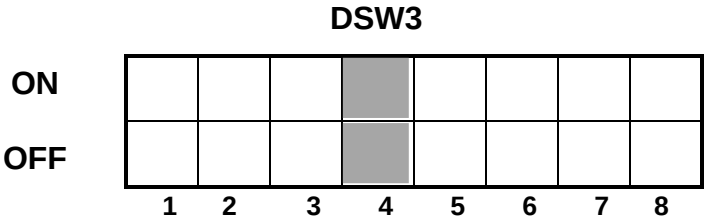
DSW3-3	SETTING
OFF	Sensor Used
ON	Not Used



Back Feed Selection (DSW3-4)

When Back-Feed is enabled, the printer will position the label for dispensing/cutting and retract it to the correct print position before printing the next label.

DSW3-4	SETTING
OFF	Disabled
ON	Enabled

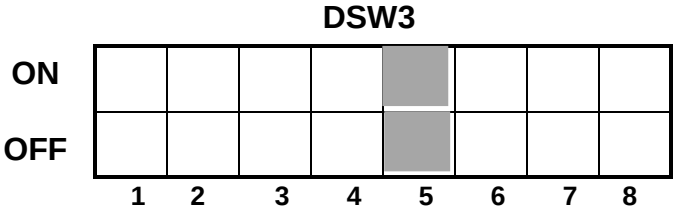


External Signal Interface

The EXT connector on the printer rear panel is intended for use with the external printer accessories such as label rewinders or applicators. The 14-pin Centronics type connector provides a choice of four different output signals along with various error conditions.

Print Start Signal Selection (DSW3-5)

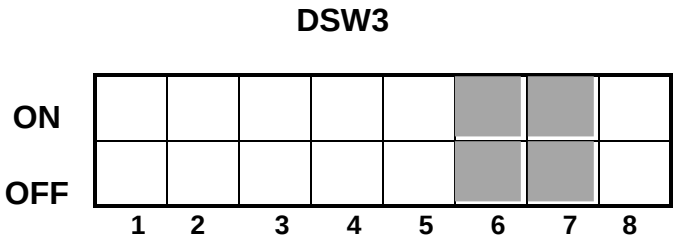
DSW3-5	SETTING
OFF	Disabled
ON	Enabled



NOTE: This switch must be in the ON position if a VeriScan is used to control the printer via the EXT connector.

External Signal Type Selection (DSW3-6, DSW3-7)
Selects the type of output signal.

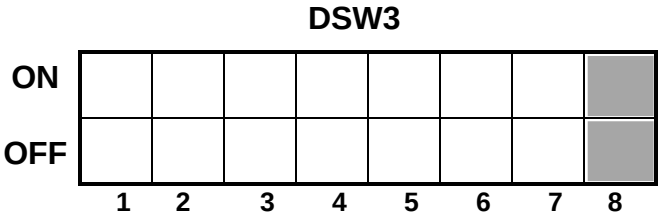
DSW3-6	DSW3-7	SETTING
Off	Off	Type 4
Off	On	Type 3
On	Off	Type 2
On	On	Type 1



Refer to Section 3.6 for a description of the available external signal types.

Repeat Print via External Signal (DSW3-8)
Allows an external device to control the reprint of the label in the print buffer.

DSW3-8	SETTING
OFF	Disabled
ON	Enabled



> ***Note:*** *The DIP Switch functions listed incorporate the latest firmware revisions at the time of printing.*

2-2 Default Settings

Switch Selections

All switches are placed in the ***Off*** position (default) for shipping. This will result in the following operating configuration:

Communications:	8 data bits, no parity, 1 Stop bit, 9600 Baud
Protocol:	Ready/Busy
Sensor:	Gap Sensor
Receive Buffer:	Single Job
Mode:	Batch/continuous
Label Sensor:	Sensor Used
Back feed:	Disabled
External Signals:	Disabled

Software Default Settings

The M8400RV stores the software settings upon receipt and uses them until they are again changed by receipt of a command containing a new setting. These settings are stored in non-volatile RAM and are not affected by powering the printer off. The printer may be reset to use the default software settings by depressing the **LINE** and **FEED** keys simultaneously while powering the printer on. This will result in the following default configuration:

User Mode Default Settings

Print Darkness:	= #3
Print Speed:	= #3=6 inches per second
Pitch Offset:	= 00 mm

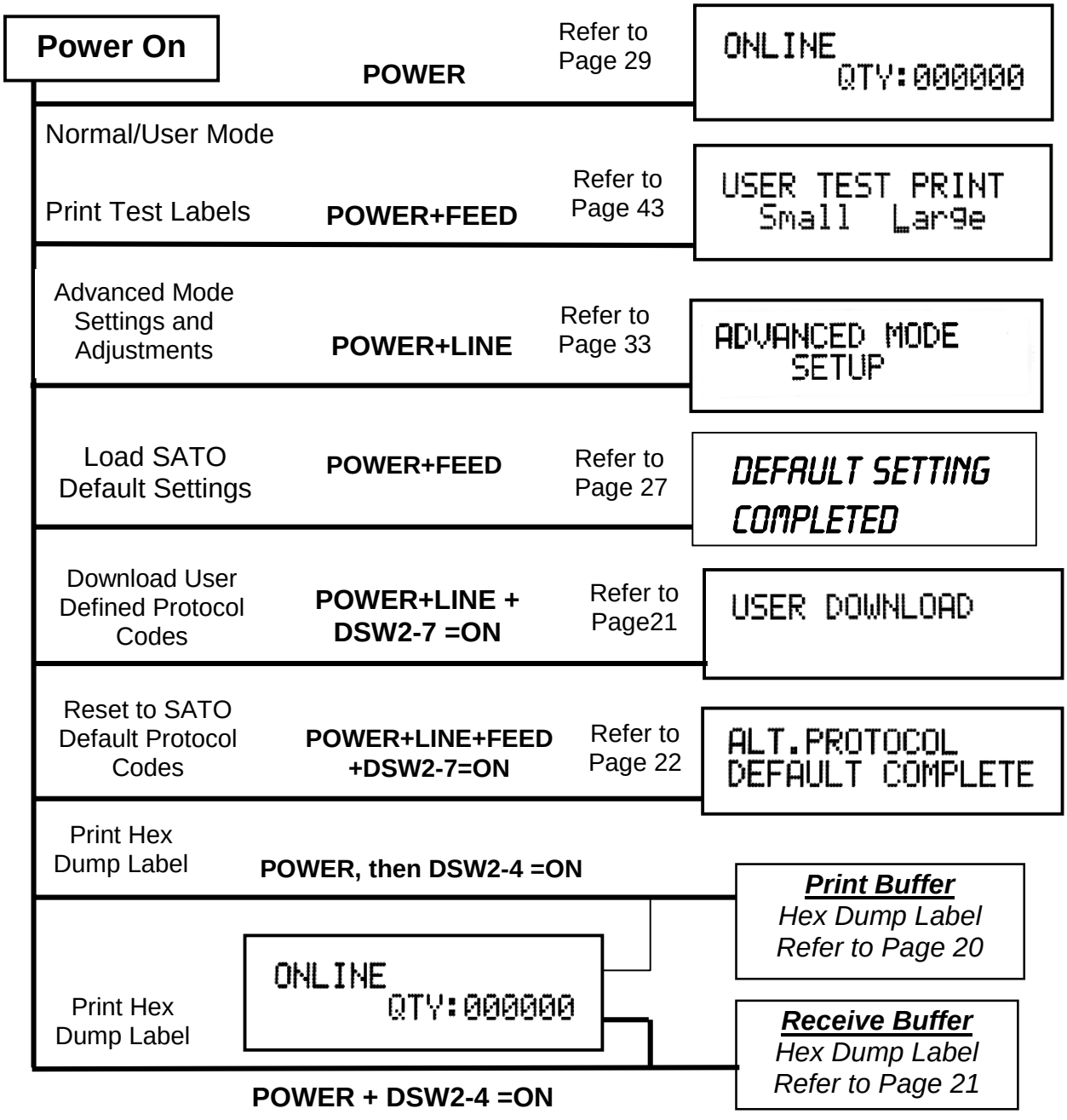
Advanced Mode Default Settings

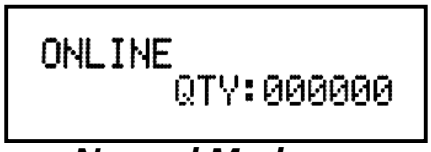
Zero Slash:	= YES
Auto Online	= YES
Vert. Offset:	= 0000
Horiz:	= 0000
Input:	= 1.5
Calendar Enabled:	= NO
Ignore CR/LF:	= NO
Print Darkness:	= #1

Once the default operation is completed, a "SATO DEFAULT COMPLETED" message will be displayed on the LCD panel and a single audible signal will be heard. The printer should be powered off while this message is being displayed. This saves the default settings in the EEPROM where they will be automatically loaded the next time the printer is powered on.

2.3 Printer Adjustments

The LCD Panel on the M-8400RV printer is used in conjunction with the ***LINE*** and ***FEED*** switches by the operator to manually enter printer configuration settings. Many of the settings can also be controlled via software commands and in the case of conflict between software and control panel settings, the printer will always use the last valid setting. If you load a label job that includes software settings and then enter a new setting via the operation panel, the manually set values will be used by the printer. If you set the values manually and then download a job with software settings, the software settings will be used.





Normal Mode

When the printer is powered on the LCD Panel will display the **ONLINE** status on the top line of the display and the bottom line will contain the label quantity (QTY) status. The **ONLINE** message will be changed to OFFLINE whenever the printer is switched offline by depressing the **LINE** key. As soon as a print job is received, the QTY message will indicate the number of labels to be printed. As soon as the label job begins to print, the display will indicate the number of labels remaining in the print job that remain to be printed.

User Mode

To enter the USER mode, perform the following steps:

STEP	PROCEDURE
1.	The printer is first taken offline by pressing the **LINE** key once. The display will change to OFFLINE.
2.	Press the **FEED** and **LINE** keys simultaneously for more than one second. The printer now displays the first USER mode adjustment (Print Darkness).

Print Darkness Setting

NOTE: Refer also to page 41 for print darkness setting Type 1 and Type 2 that work in conjunction with these fine adjustment settings.

There are five **Darkness** (or heat range) settings on the M8400RV. The higher numbers represent darker settings. The current setting is indicated by a line under one of the range settings.

To change the setting perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to the desired setting.
2.	Once the correct setting is underlined, press the **FEED** key to accept the setting and advance to the next adjustment.

Note: The setting can be overridden by software. Finer adjustments can also be made using the PRINT potentiometer setting on the adjustment panel.

Print Speed Adjustment

There are five SPEED settings on the M8400RV. Each setting is listed on the bottom line of the display. The current setting is indicated by a line under one of the speed settings.

		DSW2-8 OFF	DSW2-8 ON
PRINT SPEED 1 2 3 4 5	Print Speed Setting	1 = 2 ips 2 = 4 ips 3 = 6 ips 4 = 8 ips 5 = 10 ips	1 = 2 ips 2 = 3 ips 3 = 4 ips 4 = 5 ips 5 = 6 ips

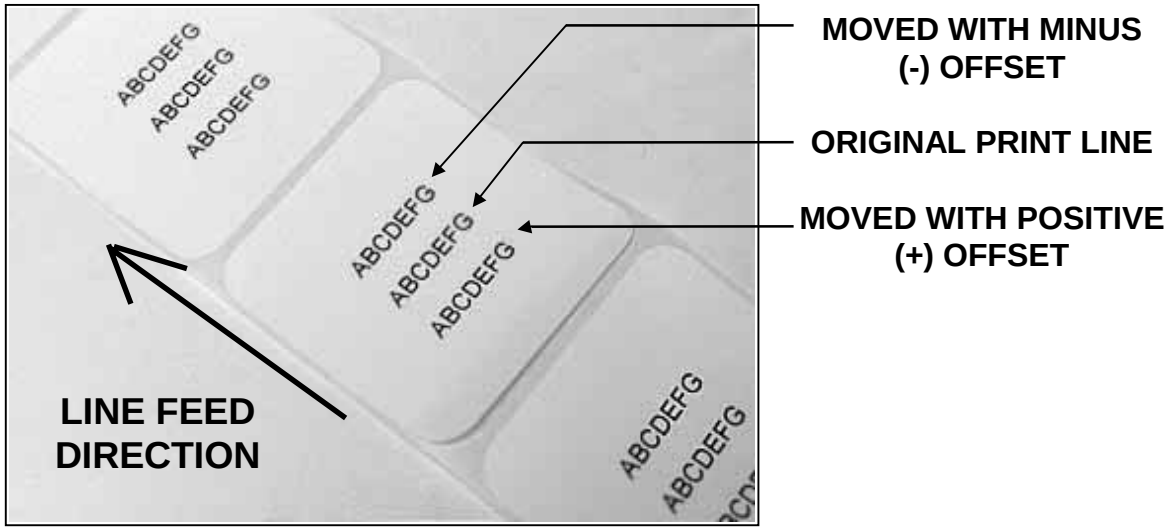
To change the setting perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to the desired setting.
2.	Once the correct setting is underlined, press the **FEED** key to accept the setting and advance to the next adjustment (Pitch Offset).

Note: This setting can be overridden by software.

Pitch Offset and Direction

The label pitch is the distance from the leading edge, (the edge that comes out of the printer first) of a label and the leading edge of the next label. The leading edge position of the label can be adjusted relative to the print head +/- 49 mm in increments of 1 mm using the following procedure. Once the position is set, it can be adjusted +/- 3.75 mm using the PITCH potentiometer on the adjustment panel.



Pitch Offset and Direction Cont.

To change the setting perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to either the positive (+) or the negative (-) selection. A positive selection increases the pitch offset direction while a negative selection decreases the pitch offset direction.
2.	Once the desired setting is underlined, press the **FEED** key to accept the (+/-) setting and advance to the first numerical position. Press the **LINE** key to set a value in the first position (0-4 only). Each time the line key is pressed, it will increment one step. Press the **FEED** key to advance to the second position to set a value. Press the line key repeatedly to advance to the desired value (0-9). Once the setting is correct, press the **FEED** key to accept the setting and advance to the Cancel Print job display.
3.	You may wish to check your settings by printing a test label after you have completed the adjustments to ensure that they are correct. See page 43 for instructions on how to print a test label.

Cancel Print Job

If the printer has a print job(s) loaded in memory, selecting YES will cause the job(s) to be cleared. The default selection is NO. Make sure that you want to cancel the print job before selecting YES as the job cannot be recovered and will have to be retransmitted to the printer.

To cancel the print, perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to either YES or NO.
2.	Once the correct setting is underlined, press the **FEED** key to accept the setting and terminate the user mode of operation and return to the normal mode OFFLINE display. If you wish to change any of the settings, you must enter the user mode again by simultaneously pressing **FEED** and **LINE** keys for more than one second.

2-4 Advanced Mode Settings and Adjustments

Advanced mode is provided to make adjustments that require only occasional adjustments. Since they affect the basic operation of the printer, the procedure for entering this mode is designed to prevent someone from accidentally changing the settings.

To enter advanced mode, the printer is powered on while pressing the **LINE** key. The printer will emit a single audible signal and display the first configuration selection on the LCD panel.

Note: If the printer firmware version you are using is 1E2040 or higher, the advanced mode is split into two sections, **Setup** and **Counters**. The **LINE** key is used to toggle between these two sections. Press the **FEED** key to enter the selected section.

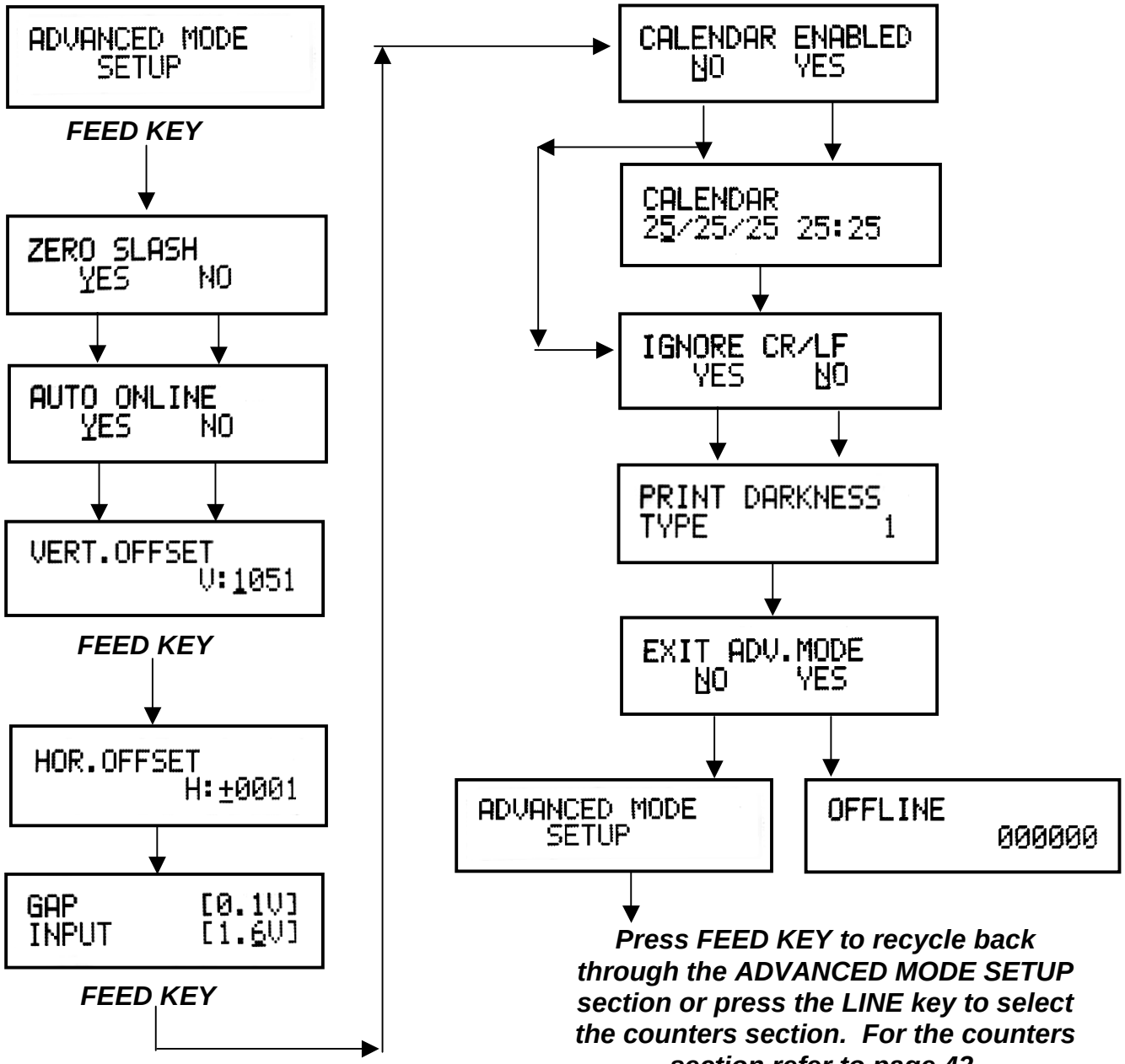
For the Setup section, see next page. For the counters section refer to page 42.

For other firmware versions the counters information can only be accessed by performing a large test print as shown on page 43.

To reset the counters refer to Section 7 Factory Resets, **Counter Clear** on page 114.

From the advanced mode display, the advanced settings are accessed in sequence by pressing the **FEED** key or the **YES/NO** keys.

Advanced Mode Flow – Refer to the following pages for a full description of each setting



Press FEED KEY to recycle back through the ADVANCED MODE SETUP section or press the LINE key to select the counters section. For the counters section refer to page 42.

2-4 Advanced Mode Settings and Adjustments

Zero Slash Setting

This setting determines if a zero is printed with a slash or without a slash. This setting can also be controlled via software commands. When YES is selected, the U, S, M, WB, WL, XU, XS, XM, XB, XL and vector fonts will have a slash through the center of the zero character.

To access this setting, perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to either YES or NO.
2.	Once the correct setting is underlined, press the **FEED** key to accept the setting and advance to the Auto Online display.

Auto Online Setting

This setting determines the mode in which the printer powers up. If the YES selection is made, the printer powers up in the ONLINE mode and is ready to print. If NO is selected, the printer powers up in the OFFLINE mode and must be manually placed in the ONLINE mode by pressing the **LINE** key before it is ready to print.

To access this setting perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to either YES or NO.
2.	Once the correct setting is underlined, press the **FEED** key to accept the setting and advance to the Vertical Offset display.

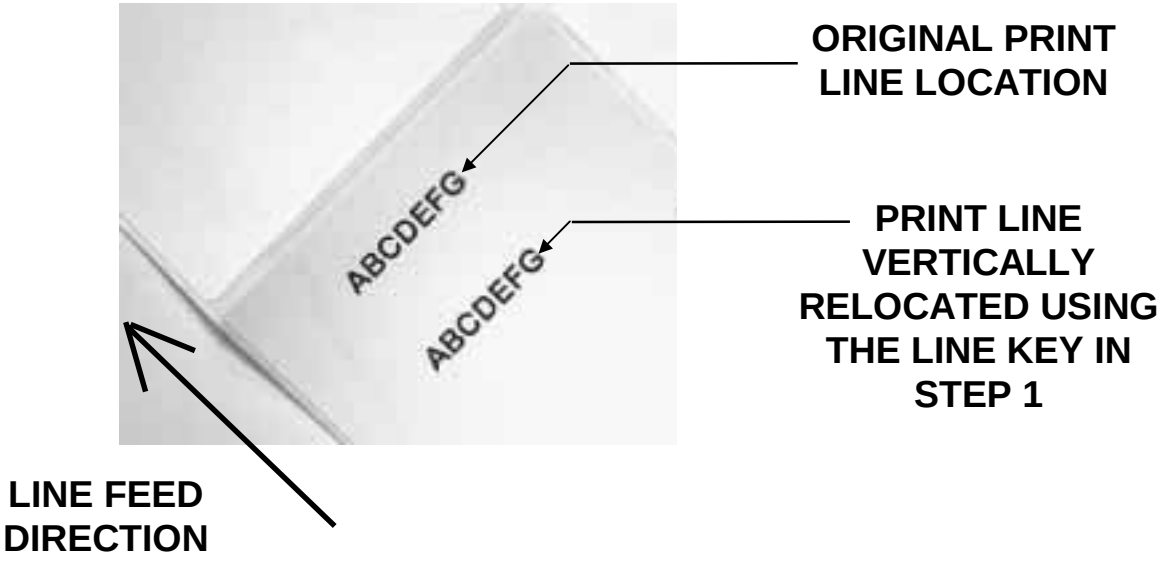
Vertical Offset Setting

Vertical Offset is the distance down from the leading edge, (the edge of the label that comes out of the printer first) to the first vertical print position. It is always a positive setting since making it negative would move it up and off the printable label. This setting changes the base reference point for all subsequent label jobs. It's effect is identical to the **<ESC>** A3 Base Reference point command. Since the printer moves the label in discrete steps equal to the size of the print dot, the units of measure for Vertical Offset distance is dots. The maximum value that can be set is 1424 (2848 in Expanded mode).
Each dot is .0049 inches (.125mm)

Note: This setting can be overridden by the Base Reference Point Command. It is recommended that you relocate printing in your software as adjustments made here will affect all of you label formats.

To access this setting perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step to the desired setting. The display will increment one step each time the **LINE** key is pressed. Press the **FEED** key to advance to each subsequent digit.
2.	Once the setting is correct, press the **FEED** key to accept the setting and advance the display to the Horizontal Direction display.


ABCDEFG
ABCDEFG
ORIGINAL PRINT LINE LOCATION
PRINT LINE VERTICALLY RELOCATED USING THE LINE KEY IN STEP 1
LINE FEED DIRECTION

Horizontal Offset and Direction

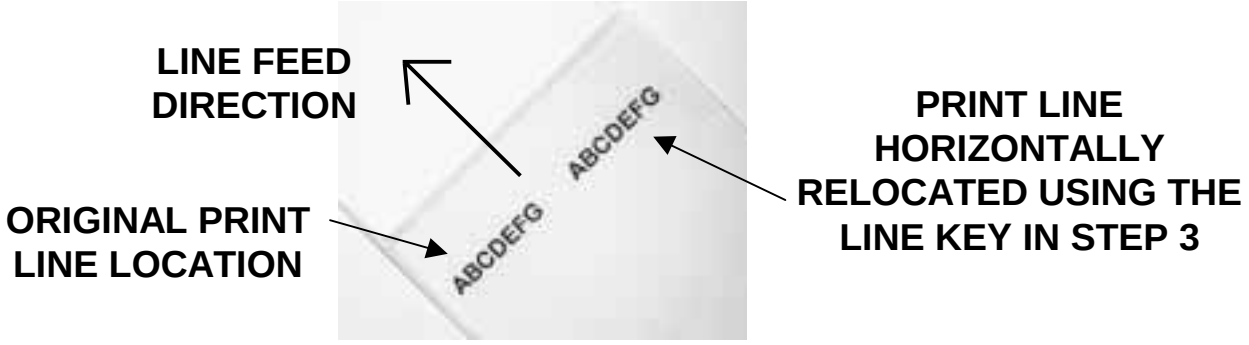
```
HOR.OFFSET
        H:±0402
```

Horizontal Offset is the distance that the label image is shifted either to the right or left on the label. The image is shifted to the left (towards the inside edge of the label) for a positive setting and is shifted to the right (towards the outside edge of the label) for a negative setting. This setting changes the base reference point for all subsequent label jobs. It's effect is identical to the **<ESC>** A3 Base Reference point command. Since the printer can only print in discrete steps equal to the size of the print dot, the units of measure for the Horizontal Offset distance is dots.

Note: This setting can be overridden by the Base Reference Point Command. It is recommended that you relocate printing in your software as adjustments made here will affect all of your label formats.

To access this setting perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underline to either the positive (+) or negative (-) selection. A positive selection increases (moves) the horizontal reference point for the label to the right edge of the label, towards the outside, while a negative selection moves the horizontal reference point for the label to the left, towards the inside of the printer.
2.	Once the setting is underlined, press the **FEED** key to accept the setting and advance the display to the Horizontal Offset adjustment.
3.	Use the **LINE** key to step the counter to the desired setting. The display will increment one step each time the **LINE** key is pressed. Press the FEED key to advance to each subsequent digit. The horizontal direction set in the previous step will be displayed in front of the Offset setting.
4.	Once the setting is correct, press the **FEED** key to accept the setting and advance to the Sensor Threshold display.


LINE FEED DIRECTION
ORIGINAL PRINT LINE LOCATION
ABCDEFG
ABCDEFG
PRINT LINE HORIZONTALLY RELOCATED USING THE LINE KEY IN STEP 3

Sensor Threshold Level

The M8400RV printer determines the location of the leading edge of the label by measuring the difference between light levels when it sees either a label edge or a black "I - Mark". This adjustment allows you to manually set the threshold voltage level between the maximum and minimum light levels. DIP switch DSW2-2 selects the sensor type. If **DSW2-2** is in the OFF position, the setting will be for a See-Thru (or Gap) sensor and the LCD will display "**GAP**" on the top line along with the current setting. If **DSW2-2** is in the **ON** position, the LCD will display "I - Mark" on the top line with its current setting. If the value entered for the bottom line setting is "0.0V", then the printer will automatically calculate the setting when the first label is fed after the printer is powered on or the head is closed. There are some instances where the automatically calculated value must be adjusted to ensure reliable label feeding, such as when the backing opacity or the reflectance of the "I - Mark" varies significantly within a roll of labels or between label rolls. In these instances the value should be set using the following procedures.

GAP SENSOR: When setting the "gap" threshold, the voltage shown on the top line of the display must be measured with nothing but the backing paper in the sensor and then again with a label still attached to the backing. The formula to be used for setting the threshold is:

(High Voltage Level + Low Voltage Level) x 0.5 = Start Value

To access this setting perform the steps:

STEP	PROCEDURE
1.	Insert a label still attached to the backing into the sensor and close the Label Hold-Down. Record the voltage shown on the top line of the LCD panel. This line should have the message "GAP" on the top line (DIP switch DSW2-2 = OFF). Make sure the label is all the way under the sensor and See Through Sensor is aligned over your label.

Sensor Threshold Level
Gap Sensor (Continued)

STEP	PROCEDURE
2.	Strip the label from the backing and insert the backing strip under the sensor and close the label lid. Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following ranges:

Backing with Label	Label Backing Only
2.0V to 3.5V	1.0V or less

If the measured values are outside this range, you may have trouble finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance or adjust VR2. See Section 4-5.

3. Calculate the starting point voltage using the formula above.

4. Use the **LINE** key to step the counter to the desired setting. The display will increment one step for each time the **LINE** key is pressed. If the **LINE** key is held down for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 4.9 (the maximum voltage) after which it will automatically wrap and start at "0.0" again. If a value of "0.0" is set, the printer will automatically set the level between the two measured voltages each time the printer is powered on with labels loaded.

5. Repeat this procedure using values slightly higher or lower until the optimum performance is obtained. If you cannot find a setting between the high and low readings that gives adequate performance, then the label stock has too much variation in its opacity and a better quality stock should be used.

6. Once the setting is correct, press the **FEED** key to accept the setting.

Sensor Threshold Level (Continued)

"(Eye) I-Mark" (Reflective) Sensor: When setting the "(Eye)I-Mark" threshold, the voltage must be measured with nothing but the label under the sensor and then again with the printed "I - Mark" under the sensor. The formula for this is:

(High Voltage Level + Low Voltage Level) x 0.5 = Start Value

To access this setting, perform the following steps:

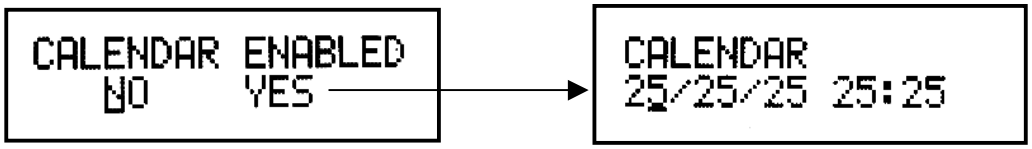
STEP	PROCEDURE
1.	Insert a label into the sensor and close the Label Hold-Down. Make sure the printed "Eye" is not under the sensor. Record the voltage shown on the top line of the LCD panel. This line should have the message "Eye" on the top line (DIP switch DSW2-2 =ON).
2.	Now pull the label forward until the "Eye" mark is positioned under the sensor (the voltage reading should be at its highest point). Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following ranges:

Label Only	Eye Mark
1.0V or less	2.5V to 3.5V

If the measured values are outside this range, you may have trouble finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance or adjust VR1. See Section 4-4.

3.	Calculate the starting point voltage using the formula.
4.	Use the **LINE** key to step the counter to the desired setting. The display will increment one step for each time the **LINE** key is pressed. If the **LINE** key is held down for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 4.9 (the maximum voltage) after which it will automatically wrap and start at "0.0" again. If a value of "0.0" is set, the printer will automatically set the level each time the printer is powered on with labels loaded or the head is closed.
5.	Repeat this procedure using values slightly higher or lower until the optimum performance is obtained. If you cannot find a setting that will give you adequate performance, then the label stock or printed "I-Mark" has too much variation in its reflectance and a better quality stock should be used.
6.	Once the setting is correct, press the **FEED** key to accept the setting.

Calendar Set



If the Calendar Option is installed in the printer, the date and time can be set manually using the LCD display or via the **<ESC>**WT Calendar Set command. The last setting, set either manually or via software command, received by the printer will be the value used. The format of the display is **YY/MM/DD hh:mm** (Year/Month/Day/hours: minutes). The date format is fixed and cannot be changed.

To access this setting, perform the following steps:

STEP	PROCEDURE
1.	**Year:** The first display shown will have the two digit year selection underlined. Press the **LINE** key to scroll through the dates. The year number will increase by one value each time the **LINE** key is pressed.
2.	**Month:** After you have set the correct year, press the **FEED** key to advance the underline cursor to the two digit Month position. Press the **LINE** key to scroll through the numbers corresponding to the month. The month number will increase by one value each time the **LINE** key is pressed.
3.	**Day:** After you have set the correct month, press the **FEED** key to advance the underline cursor to the two digit Day position. Press the **LINE** key to scroll through the numbers corresponding to the date. The date number will increase by one value each time the **LINE** key is pressed.
4.	**Hour:** After you have set the correct date, press the **FEED** key to advance the underline cursor to the two digit Hour position. Press the **LINE** key to scroll through the numbers corresponding to the hour (using a 24 hour clock). The hour number will increase by one value each time the **LINE** key is pressed.
5.	**Minute:** After you have set the correct hour, press the **FEED** key to advance the underline cursor to the two digit minute position. Press the **LINE** key to scroll through the numbers corresponding to the minute. The minute number will increase by one value each time the **LINE** key is pressed.
6.	After you have set the calendar, press the **FEED** key to accept the setting and advance to the next display.

Ignore Carriage Return/Line Feed

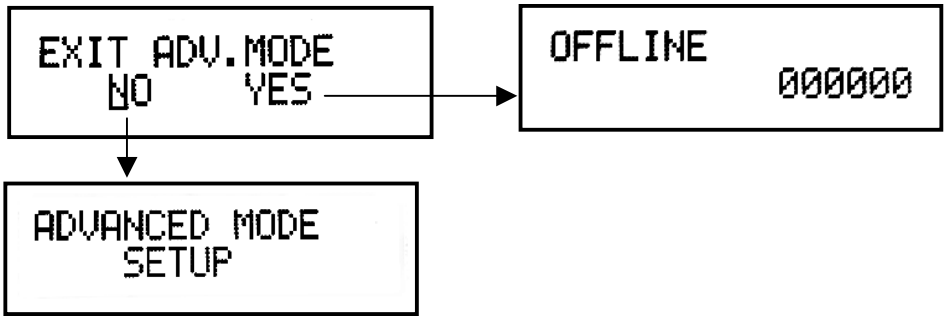
This setting is an entry provided to ignore a Carriage Return or Line Feed command in the data stream.

Print Darkness Setting

There are two Darkness (or heat range) settings. The higher number represents darker settings. The current setting is indicated by an line under one of the range settings. Refer to page 29 for user mode darkness settings that work in conjunction with these two broad range settings.

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to the desired setting.
2.	Once the desired setting is underlined, press the **FEED** key to accept the setting and advance to the next adjustment.

Exit Mode



To access this setting, perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underlined cursor to either **NO** or **YES**.
2.	Once the desired setting is underlined, press the **FEED** key to advance the display to the offline mode if **YES** is selected or to recycle back through the advanced mode if **NO** is selected.

Advance Mode Counters

For firmware versions 1E2040 or higher. For all other firmware versions, refer to Section 7 for Counter Clear instructions.

The Counter Clear display is used to reset the internal printer counters to zero. The counters allow the user to keep track of the number of centimeters of label material that HAS PASSED THROUGH THE PRINTER, HOW MANY LABELS HAVE BEEN DISPENSED, OR HOW MANY LABELS have been cut. The correct counter values can be viewed by printing out a test label.

The Counters are identified in the display as:

LIFE: Life
HD: Head Counter
DSP: Dispense Counter
CUT: Cutter Counter

To access this setting, perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underline cursor to the counter to be reset or displayed; the Head counter (HD), Dispenser (DSP) counter, CUT (Cutter) counter, or the LIFE counter.
2.	Once the correct setting is underlined, press the **FEED** key to display selected counter value in meters.
3.	Press the **FEED** key to advance to the Counter Clear display (CNTR CLEAR). Use the **LINE** key to underline **YES** if you want to reset the counter to 0. Underline **NO** to keep the current values. Press **FEED** to continue the desired operation and advance to the EXIT ADV Mode display
4.	Using the **LINE** key, underline **YES** or **NO** to exit advanced mode (YES/NO) to return to the Advanced Mode Setup display.

2-5 Printing Test Labels

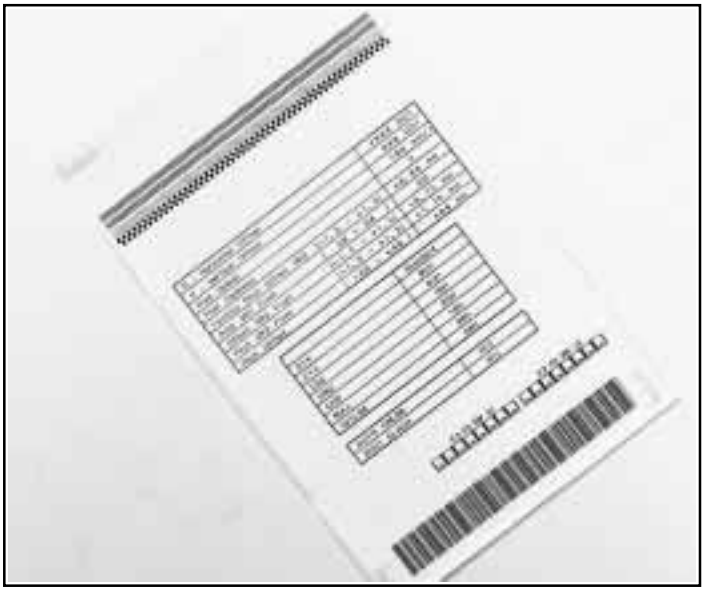
This option allows you to print a test label. It is recommended that you print a test label after you have changed any of the settings in the Advanced Mode. The test label allows you to verify that you indeed did make the desired changes. To enter the User Test Print Mode, power up the printer while pressing the **FEED** key and a single audible signal will be heard. Release the **FEED** key and the printer to display the following message on the LCD panel.

Print Size

```
USER TEST PRINT
  Small  Large
```

To access this setting, perform the following steps:

STEP	PROCEDURE
1.	Use the **LINE** key to step the underline cursor to either the Large or Small selection. If Large is underlined, a label will be printed for a maximum width label (4"). Press the **FEED** key to print the label which will contain a head check pattern and current printer setting information. The default position is Large.



Print Size (Cont.)

1. Cont. If **SMALL** is underlined, the Print Size message will be displayed. You must enter the size of the label. The minimum label size that can be selected is 4 cm (1.6”) and the maximum size is 10 cm (3.9”).

   Press the **LINE** key to increment the setting by 1 cm each time the key is pressed. Once the maximum size is reached, the display will wrap around and start incrementing at 04 cm again. Once the correct label width is selected, press the **FEED** key to initiate the print. The **SMALL** label only contains a head check pattern.

2. If you wish to pause the printer after it starts to print a test label, press the **LINE** key to place it Off Line. Press the **LINE** key again to place the printer back On Line and to resume the test label printing. To stop the test label print, pause the printer and then turn power off without placing it On Line.

Section

3

Interface Specifications

3-1 Overview

This section explains the interface specifications for the M8400RV printer. These specifications include detailed information on how to properly interface your printer with your host system, and includes data about the following:

- *INTERFACE TYPES*
- *USING THE RECEIVE BUFFER*
- *RS232C SERIAL INTERFACE*
- *CENTRONICS PARALLEL INTERFACE*
- *ACCESSORY (EXT) CONNECTOR*

3-2 Interface Types

In order to provide flexibility in communicating with a variety of host computer systems, all M8400RV printers can be configured for operation with either parallel or serial data transfers. Both a parallel Centronics and a serial RS232 interface are supplied with the standard printer.

The Centronics Parallel interface will probably be the most useful in communicating with IBM PCs and compatibles. The RS232C Serial interface allows connectivity to a number of other hosts. For instructions on how to properly configure the M8400RV printer for either of these interface types, see the printer configuration instructions in Section 2 of this manual.

NOTE: Both the Centronics and RS232C interfaces are active at the same time, i.e. data can be received on either one, however no provision is made for port contention. If data is transmitted to both ports simultaneously, it will cause the data in the receive buffer to be corrupted.

3-2 Interface Types (Cont.)

WARNING: Never connect or disconnect interface cables or use a switch box with power applied to either the host or the printer. This may cause damage to the interface circuitry in the printer/host and is not covered by warranty.

The receiving buffer will not be able to receive more data again until a "Buffer Available" condition occurs. This takes place when the receiving buffer has emptied so that only 56K bytes of data are being held (8K bytes from being full). At this time, **DTR** will go "high" or an **X-On** is sent to tell the host that it can again receive data.

All printer error conditions, (i.e., label out, ribbon out), will cause the printer to go busy (**DTR** "low" or **X-Off**) until the problem is corrected, and the printer is placed on-line. The printer will also be busy if taken off-line from the front panel.

3-3 The Receive Buffer

The M8400RV printer has the ability to receive a data stream from the host in one of two ways. The receive buffer may be configured to accept one print job at a time or multiple print jobs. The single job print buffer is generally used by software programs that wish to maintain control of the job print queue so that it can move a high priority job in front of ones of lesser importance. The multiple job buffer, on the other hand, prints all jobs in the order they are received by the printer, and the order of printing cannot be changed.

Single Job Buffer

The printer receives and prints one job at a time. Each job must not exceed 64 K bytes.

Multi Job Buffer

The printer is able to continuously receive print jobs, compiling and printing other jobs at the same time. It acts much like a "print buffer" to maximize the performance of the host and the printer. When using the RS232 Serial interface, the Multi Job Buffer uses either the **Ready/Busy** with **DTR** (pin 20) or **X-On/X-Off** flow control protocols. See these sections for more details. With an empty receiving buffer, the status of **DTR** is "high" (or an **X-On** status if using **X-On/X-Off**), meaning the printer is ready to receive data. When the receive buffer is holding 62K bytes of data (2K bytes from being full), **DTR** will go "low" (or an **X-Off** is sent) indicating the printer can no longer receive data. This condition is called "Buffer Near Full". See Figure 3-1.

Multi Job Buffer (Cont.)

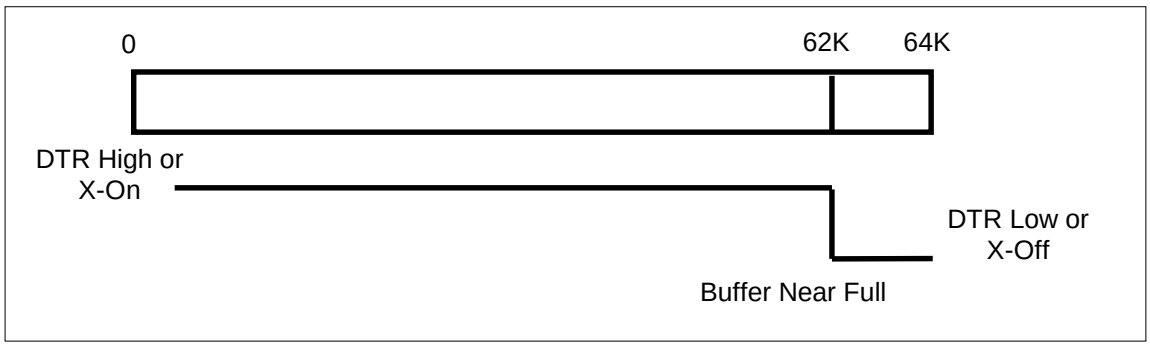


Fig. 3-1

The receiving buffer will not be able to receive more data again until a "Buffer Available" condition occurs. This takes place when the receiving buffer has emptied so that only 56K bytes of data are being held (8K bytes from being full). At this time, **DTR** will go "high" or an **X-On** is sent to tell the host that it can again receive data. See Figure 3-2.

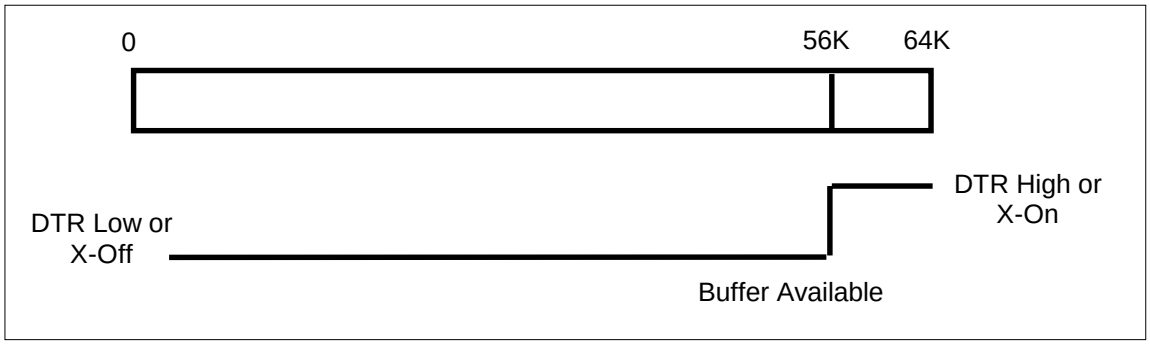


Fig. 3-2

3-4 RS232C Serial Interface

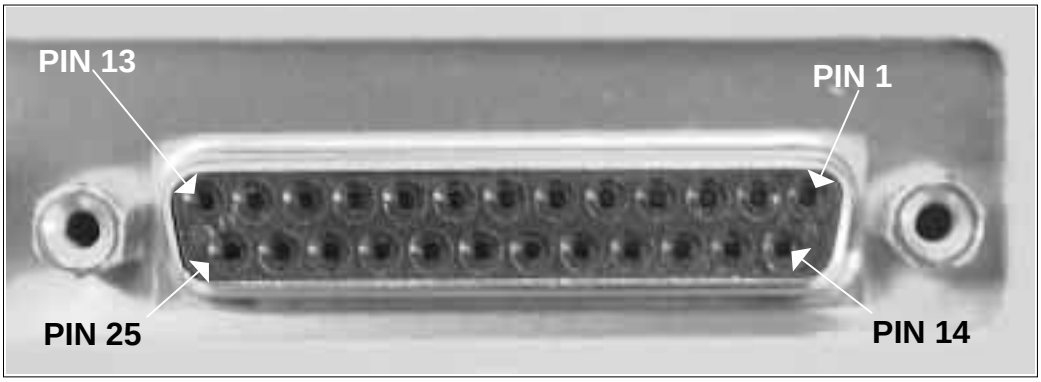
General Specifications

Asynchronous ASCII	Half-duplex communication. Ready/Busy Hardware Flow Control Pin 20, DTR Control Pin 4, RTS Error Condition X-On/X-Off Software Flow Control Bi-Directional communication (ENQ/Response)
Data Transmission Rate	2400, 4800, 9600 and 19200 bps
Character Format	1 Start Bit (fixed) 7 or 8 data bits (selectable) Odd, Even or No Parity (selectable) 1 or 2 Stop bits (selectable)

3-4 RS232C Serial Interface (Cont.)

Electrical Specifications

Connector	DB-25S (Female



Cable	DB-25P (Male), 50 ft. maximum length. For cable configuration, refer to Cable Requirements appropriate to the RS232C protocol chosen.
Signal Levels	High = +5V to +12V Low = -5V to -12V

Pin Assignments

RS232C Interface Signals

PIN	DIRECTION	SIGNAL DESCRIPTION
1	Reference	FG (Frame Ground)
2	To Host	TD (Transmit Data) - Data from the printer to the host computer. Sends X-On/X-Off characters or status data (Bi-Directional protocol).
3	To Printer	RD (Receive Data) - Data to the printer from the host computer.

3-4 RS232C Serial Interface (Cont.)

Pin Assignments (Cont.)

RS232C Interface Signals

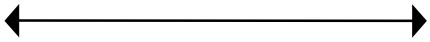
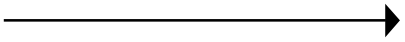
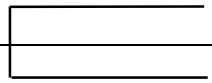
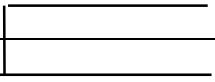
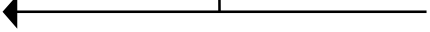
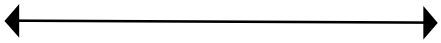
PIN	DIRECTION	SIGNAL DESCRIPTION
4	To Host	RTS (Request to Send) - Used with Ready/Busy flow control to indicate an error condition. RTS is high and remains high unless the print head is open, (in this case, RTS would return to the high state after the print head is closed and the printer is placed back on-line) or an error condition occurs during printing (e.g., ribbon out, label out).
5	To Printer	CTS (Clear to Send) - When this line is high, the printer assumes that data is ready to be transmitted. The printer will not receive data when this line is low. If this line is not being used, it should be tied high (to pin 4).
6	To Printer	DSR (Data Set Ready) - When this line is high, the printer will be ready to receive data. This line must be high before data is transmitted. If this line is not being used, it should be tied high (to pin 20).
7	Reference	SG (Signal Ground).
20	To Host	DTR (Data Terminal Ready) - This signal applies to Ready/Busy flow control. The printer is ready to receive data when this pin is high. It goes low when the printer is off-line, either manually or due to an error condition, and while printing in the Single Job Buffer mode. It will also go low when the data in the buffer reaches the Buffer Near Full level.

Ready/Busy Flow Control

Ready/Busy is the hardware flow control for the serial interface on the M8400RV printer. By raising/lowering the voltage level on Pin 20 of the RS232 port, the printer notifies the host when it is ready to receive data. Pin 4 (RTS) and Pin 20 (DTR) are the important signals on the printer for this method of flow control. The host must be capable of supporting this flow control method for it to function properly.

3-4 RS232C Serial Interface (Cont.)

Cable Requirements

HOST	INTERCONNECTION	PRINTER
FG		1 FG (Frame Ground)
TD		3 RD (Receive Data)
		4 RTS (Request to Send)
		5 CTS (Clear to Send)
		6 DSR (Data Set Ready)
*		20 DTR (Data Terminal Ready)
SG		7 SG (Signal Ground)

* This connection at the host side of the interface would depend upon the pin that is being used as the Ready/Busy signal by the driving software. Typically, on a PC, it would be either CTS (pin 5) or DSR (pin 6) on a DB-25 connector.

Data Streams

Once the flow control method has been chosen for the RS232C interface, the data stream must be sent in a specific manner. The STX aznd ETX Control characters must frame the data stream.

<STX><ESC>A..Job#1..<ESC>Z<ETX><STX><ESC>A..Job#n..<ESC>Z<ETX>

NOTE: All characters, including STX, ESC and ETX are in ASCII.

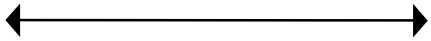
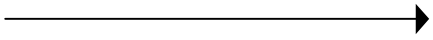
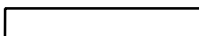
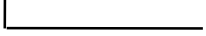
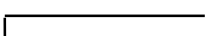
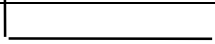
3-4 RS232C Serial Interface (Cont.)

X-On/X-Off Flow Control

X-On/X-Off flow control must be used whenever hardware (Ready/Busy) flow control is not available or desirable. Instead of a voltage going high/low at pin 20, control characters representing "Printer Ready" (X-On = 11 hexadecimal) or "Printer Busy" (X-Off = 13 hexadecimal) are transmitted by the printer on pin 2 (Transmit Data) to the host. In order for this method of flow control to function correctly, the host must be capable of supporting it. **X-On/X-Off** operates in a manner similar to the function of pin 20 (**DTR**) as previously explained. When the printer is first powered on and goes on-line, an **X-On** is sent out. In the Single Job Buffer mode, when the printer receives a viable job, it transmits an **X-Off** and begins printing. When it is done printing, it transmits an **X-On**. In the Multi Job Buffer mode, the printer sends an **X-Off** when the "Buffer Near Full" level is reached and a **X-On** when the data level of the buffer drops below the "Buffer Available" mark. When the printer is taken off-line manually, it transmits an **X-Off** indicating it cannot accept data. When it is placed back on line manually, it sends an **X-On**, indicating it is again available for receipt of data. If an error occurs during printing (paper out, ribbon out), the printer sends nothing in the Single Job Buffer mode since the last character transmitted was an **X-Off**. When the error is cleared and the printer resumes printing, no **X-On** is sent until the current job is completed and the printer is once again read to receive the next job. If it is in the Multi Job Buffer mode, it sends an **X-Off** as soon as an error condition is detected. When the error is cleared and the printer is placed back on-line, it transmits an **X-On** indicating it is again ready to accept data.

Upon power up, if no error conditions are present, the printer will continually send **X-On** characters at five millisecond intervals until it receives a transmission from the host.

Cable Requirements

HOST	INTERCONNECTION	PRINTER
FG		1 FG (Frame Ground)
RD		2 TD (Transmit Data)
TD		3 RD (Receive Data)
		4 RTS (Request to Send)
		5 CTS (Clear to Send)
		6 DSR (Data Set Ready)
*		20 DTR (Data Terminal Ready)
SG		7 SG (Signal Ground)

3-4 RS232C Serial Interface (Cont.)

X-On/X-Off Flow Control (Cont.)

Data Streams

The Data streams for **X-On/X-Off** are constructed in the same way as they are for Ready/Busy flow control. The **STX** and **ETX** control characters must frame the data stream. (NOTE: All characters, including **STX, ESC** and **ETX** are in ASCII).

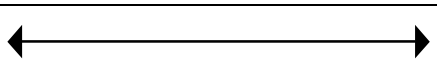
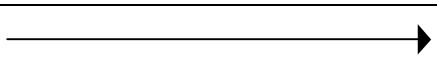
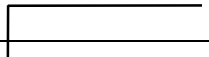
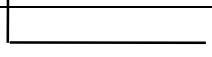
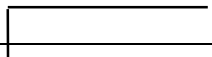
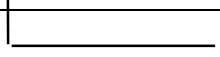
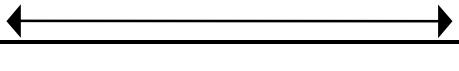
<STX><ESC>A..Job#1..<ESC>Z<ESC>A..Job#n..<ESC>Z<ETX

Example: <STX>A..Job#1..<ESC>Z<ETX>XXXX

Bi-Directional Communications

This is a two-way communications protocol between the host computer and the printer, thus enabling the host to check printer status. When this protocol is selected, there is no busy signal from the printer (pin 20, **DTR**, is always high). The host must request the complete status from the printer, including ready/busy. Whenever the host requests printer status, it transmits an **ENQ** to the printer and the printer will respond with its status within five milliseconds. If printing, it will respond upon finishing the current label, then resume printing. In order for this protocol to work properly, pin 6 (**DTR**) and pin 5 (**CTS**) must be held high by the host. One way to ensure these pins are always in the correct state is to tie pin 20 (**DTR)** to pin 6 (**DSR**) and pin 4 (**RTS**) to pin 5 (**CTS**) at the printer end of the cable.

Cable Requirements

HOST	INTERCONNECTION	PRINTER
FG		1 FG (Frame Ground)
RD		2 TD (Transmit Data)
TD		3 RD (Receive Data)
		4 RTS (Request to Send)
		5 CTS (Clear to Send)
		6 DSR (Data Set Ready)
*		20 DTR (Data Terminal Ready)
SG		7 SG (Signal Ground)

If a **CAN** (18 hexadecimal) is received by the printer, it will cancel the current print job and clear all data from the receive buffer.

3-4 RS232C Serial Interface (Cont.)

Bi-Directional Communications (Cont.)

Status Response

The Bi-Directional protocol is an advanced version of bi-directional communications where the printer can also report the number of labels remaining to be printed for the current print job. Upon receipt of an **ENQ** command, the printer responds with nine bytes of status information bounded by an **STX/ETX** pair. The Bi-Directional protocol works only in the Multi Job Buffer mode. The status information is defined as follows:

<STX>{2 Byte ID}{1 Status Byte}{6 Byte Label Remaining}<ETX>

ID - This is a two byte number identifying the current print job ID. The print job ID is defined using the **<ESC>ID** Job ID command transmitted with the print job, (see Job ID Store in the command listing for more information on how to use this command). The range is from 00 to 99.

Status - A single byte defining the current status of the printer, (see the Status Byte Definition table).

Label Remaining - Six bytes defining the number of labels remaining in the current print job. The range is from 000000 to 999999 labels.

If an **ENQ** is received after the print job specified in the ID bytes has been completed, or there is no data in the buffer, the printer will respond with two "space" characters (20 hexadecimal) for the ID number and six "zero" characters (30 hexadecimal) in the Remaining Labels bytes.

If a **CAN** (18 hexadecimal) command is received, it will stop the print job and clear all data from the receive and print buffers. A delay of five milleseconds or more is required before any new data can be downloaded. The **CAN** command is effective immediately upon receipt, even if the printer is off-line or in an error condition. The printer will return an **ACK** (06 hexadecimal) if there is no printer error condition and a **NAK** (15 hexadecimal) if an error condition exists.

Upon receipt of a valid print job **(<ESC>A...<ESC>Z)**, and **ACK** (06 hexadecimal) will be returned by the printer if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

3-4 RS232C Serial Interface (Cont.)

Status Byte Definition, Bi-Directional Protocol

ASCII	HEX	DEFINITION
OFF-LINE		
0	30	No Errors
1	31	Ribbon Near End
2	32	Buffer Near Full
3	33	Ribbon Near End and Buffer Near Full
ON-LINE, WAITING FOR DATA		
A	41	No Errors
B	42	Ribbon Near End
C	43	Buffer Near Full
D	44	Ribbon Near End and Buffer Near Full
ON-LINE, PRINTING		
G	47	No Errors
H	48	Ribbon Near End
I	49	Buffer Near Full
J	4A	Ribbon Near End and Buffer Near Full
ON-LINE, WAITING TO DISPENSE A LABEL		
M	4D	No Errors
N	4E	Ribbon Near End
O	4F	Buffer Near Full
P	50	Ribbon Near End and Buffer Near Full
ON-LINE COMPILING PRINT JOB		
S	53	No Errors
T	54	Ribbon Near End
U	55	Buffer Near Full
V	56	Ribbon Near End and Buffer Near Full

3-4 RS232C Serial Interface (Cont.)

Status Byte Definition, Bi-Directional Protocol

ASCII	HEX	DEFINITION
OFF-LINE, ERROR CONDITION		
a	61	Receive Buffer Full
b	62	Head Open
c	63	Paper End
d	64	Ribbon End
e	65	Media Error
f	66	Sensor Error
g	67	Head Error
i	68	Memory Card Error
j	6A	Cutter Error
k	6B	Other Error Condition

3-5 Centronics Parallel Interface

Electrical Specifications

Printer Connector	AMP 57-40360 (DDK) or equivalent
Cable Connector	AMP 57-30360 (DDK) or equivalent
Cable Length	10 ft. or less
Signal Level	High = +2.4V to +5.0V Low = 0V to -0.4V

Data Streams

Single Job Buffer: The Single Job Buffer mode is not available when using the Centronics interface

Multi Job Buffer: <STX><ESC>A..Job#1..<ESC>Z<ETX>
<STX><ESC>A..Job#n..<ESC>Z<ETX>

*Note that for parallel communications, the **STX** and **ETX** characters are not required.*

3-5 Centronics Parallel Interface (Cont.)

Centronics Parallel Interface Pin Assignments

PIN	SIGNAL	DIRECTION	PIN	SIGNAL	DIRECTION
1	$\overline{\text{STROBE}}$	To Printer	19	STROBE Return	Reference
2	DATA 1	To Printer	20	DATA 1 Return	Reference
3	DATA 2	To Printer	21	DATA 2 Return	Reference
4	DATA 3	To Printer	22	DATA 3 Return	Reference
5	DATA 4	To Printer	23	DATA 4 Return	Reference
6	DATA 5	To Printer	24	DATA 5 Return	Reference
7	DATA 6	To Printer	25	DATA 6 Return	Reference
8	DATA 7	To Printer	26	DATA 7 Return	Reference
9	DATA 8	To Printer	27	DATA 8 Return	Reference
10	$\overline{\text{ACK}}$	To Printer	28	ACK Return	Reference
11	BUSY	To Host	29	BUSY Return	Reference
12	PTR ERROR	To Host	30	PE Return	Reference
13	SELECT	To Host	31		
14			32	$\overline{\text{FAULT}}$	To Host
15			33		
16			34		
17	FG	Frame Ground	35		
18	+5V (Z=24K ohm)		36		

3-6 Accessory (EXT) Connector

The Accessory (or EXT) connector on the M8400RV printer is intended for use with the external printer accessories such as label rewinders or applicators. The 14 pin Centronics type connector provides a choice of four different output signals along with various error conditions.

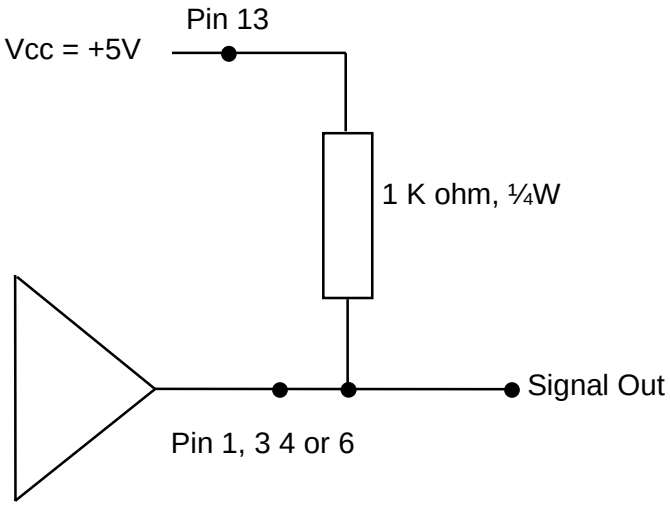
PIN Assignments

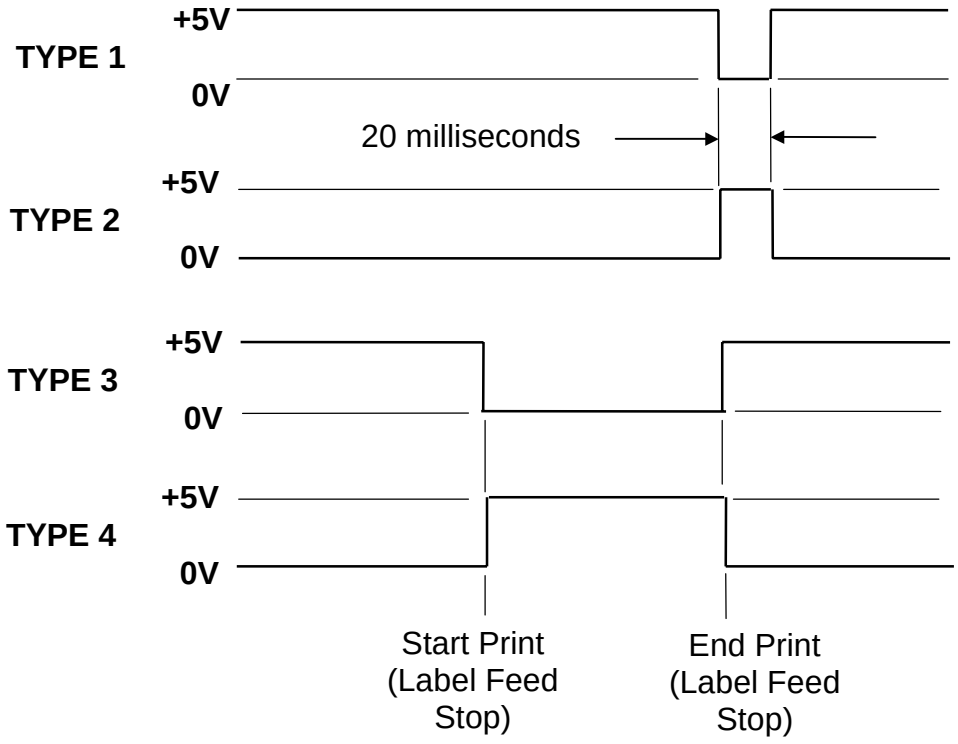
PIN	DIRECTION	SIGNAL DESCRIPTION
1	To Host	Label Out - This pin goes low (0V) when a "label out" error exists.
2	Reference	Signal Ground
3	To Host	Ribbon Out - This pin goes low when the ribbon supply is exhausted.
4	To Host	Error - This pin goes low when the printer detects an error condition such as head open or receiving buffer full.
5	To Printer	Print Start - The printer will print one label when this pin is pulled to ground. This signal must be enabled by placing switch DSW3-5 on the Control Panel in the ON position.
6	To Host	End Print - It is used to drive an applicator or other external device requiring synchronization with the print cycle. You may choose between four types of output signals using control panel DSW3-6 and DSW3-7 selections.
7	To Printer	Print Repeat - The printer repeatedly prints the current label in the print buffer immediately after receiving this signal. DSW3-8 must be ON.
10	To Host	+12V - Used to power accessory items.
12	To Host	+24V - Used to power accessory items.
13	To Host	Vcc - +5V
14	Reference	Frame Ground

NOTE: The signals on pins 1, 3 4 and 6 each have an open collector output. These pins normally measure +.07V maximum when a true condition exists. If a false condition occurs, the voltage will drop to 0V. To achieve a signal level of +5V, you must add a 1K ohm, ¼ W pull-up resistor between the open collector output pin and Vcc (pin 13) as illustrated. This will provide a signal level of +5V for a true condition and 0V when a false condition exists. The maximum voltage that can be applied to these pins is +50V and the maximum current they can sink is 500 milliamps.

3-6 Accessory (EXT) Connector (Cont.)

External Output Signal Types





Section

4

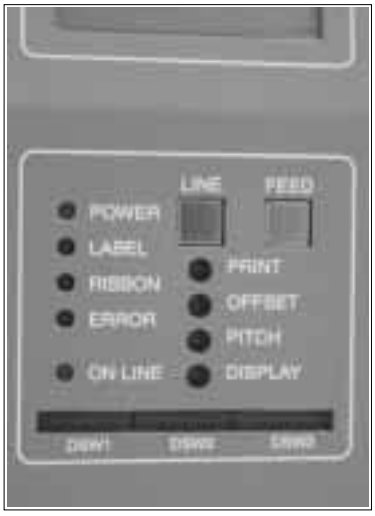
Electrical Checks and Adjustments

4-1 Overview

This chapter describes how to check M-8400RV voltage levels and adjust threshold sensor voltages.

The M-8400RV power supply converts 125 VAC into regulated DC voltages. The printer uses: +5V, +12V, -12V and +24V. These DC voltages are not adjustable, however you can measure these DC voltages at test points located on the PCB. If a voltage is out of specification, the power supply must be replaced. Section 4.1 contains procedures for measuring DC voltage levels. Power supply removal and replacement procedures are located in Section 6.5.

You can adjust threshold voltage levels for label sensors. These adjustments are made to allow for variations in the characteristics of the labels used with the printer. If you cannot calibrate the label sensor voltage level within the specified voltage range, you should reposition the label sensor by following the adjustment procedures included in this section. After completing the label sensor adjustment procedures, perform the label sensor voltage level adjustment procedure.



You can check or adjust:

- *Power Supply*
- *Label Sensor*
- *Ribbon Sensor*
- *Pitch Offset*
- *Label Positions*

4-2 Steps Prior to Adjustments

All the adjustments in this section begin by removing the covers to the mechanical section and removing the LH cover to gain access to the main PCB.

Required Equipment:	Number 2 Phillips Screwdriver

STEP	PROCEDURE
1.	Open the top and side access doors on the mechanical side of the printer.
2.	Loosen (2) inside screws holding the Left Side Cover to the inside top of the printer. Remove (2) screws holding the Left Side Cover to the printer base at the outside of the printer and remove the cover to expose the main PCB. Refer to ***Fig. 4-1, 4-2 & 4-3.*** Refer to the appropriate sub-section to begin adjustments.

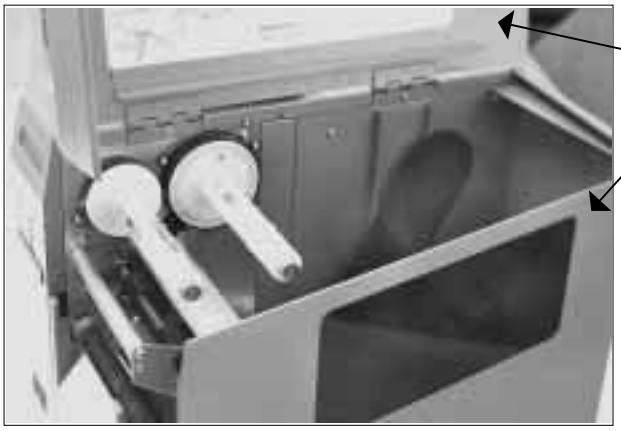


Fig. 4-1

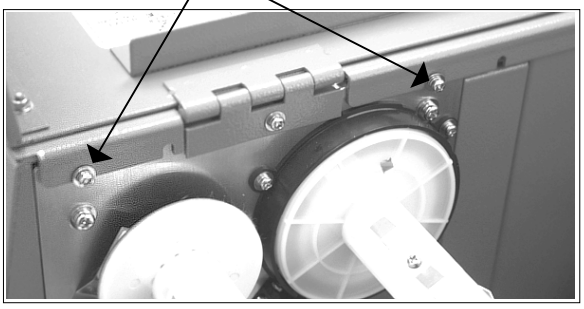


Fig. 4-2

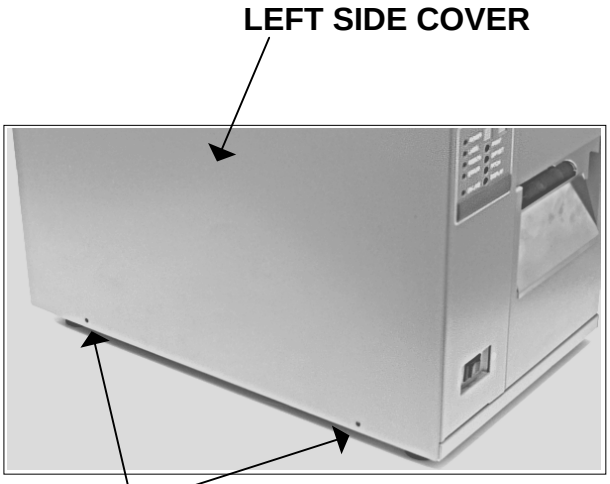


Fig. 4-3

4-3 Power Supply Checks

Required Equipment:	• Number 2 Phillips Screwdriver • DC Voltmeter

To check voltage levels, first check the Main fuses (6.1) and replace if necessary, then perform the following steps:

STEP	PROCEDURE
	Refer to Section 4.2 for steps prior to adjustment
1.	On the main circuit board attach the DC voltmeter negative lead to the test point labeled CH1 (Ground) on the main circuit board. Attach the DC voltmeter positive lead to the corresponding voltage test point and place the power switch in the ON position. Refer to table below and ***Fig. 4-4, 4-5***.

Test Points	Nominal Voltage	Range
CH1 & CH3	+4.8 to +5.2V	+5V
CH1 & CH4	+11.4 to +12.6	+12V
CH1 & CH5	-11-4 to -12.6	-12V
CH1 & CH6	+23.5 to +24.5	+24V

NOTE: The power supply voltages are not adjustable. All voltages must read within +/- 10% of the nominal value for correct operation of the printer.

2. After performing tests, replace and secure the Left Side Cover to the printer base with (2) screws previously removed. Tighten (2) inside screws and close the doors.

4-3 Power Supply Checks

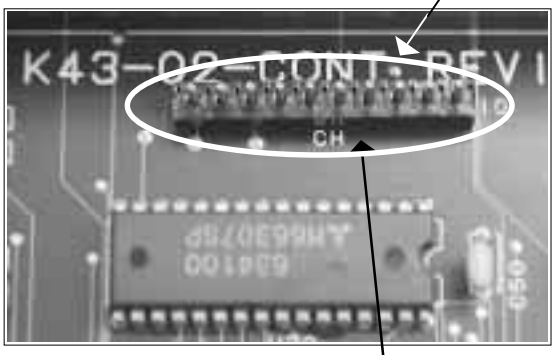


Fig. 4-4

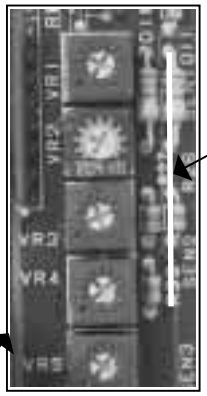


Fig. 4-5

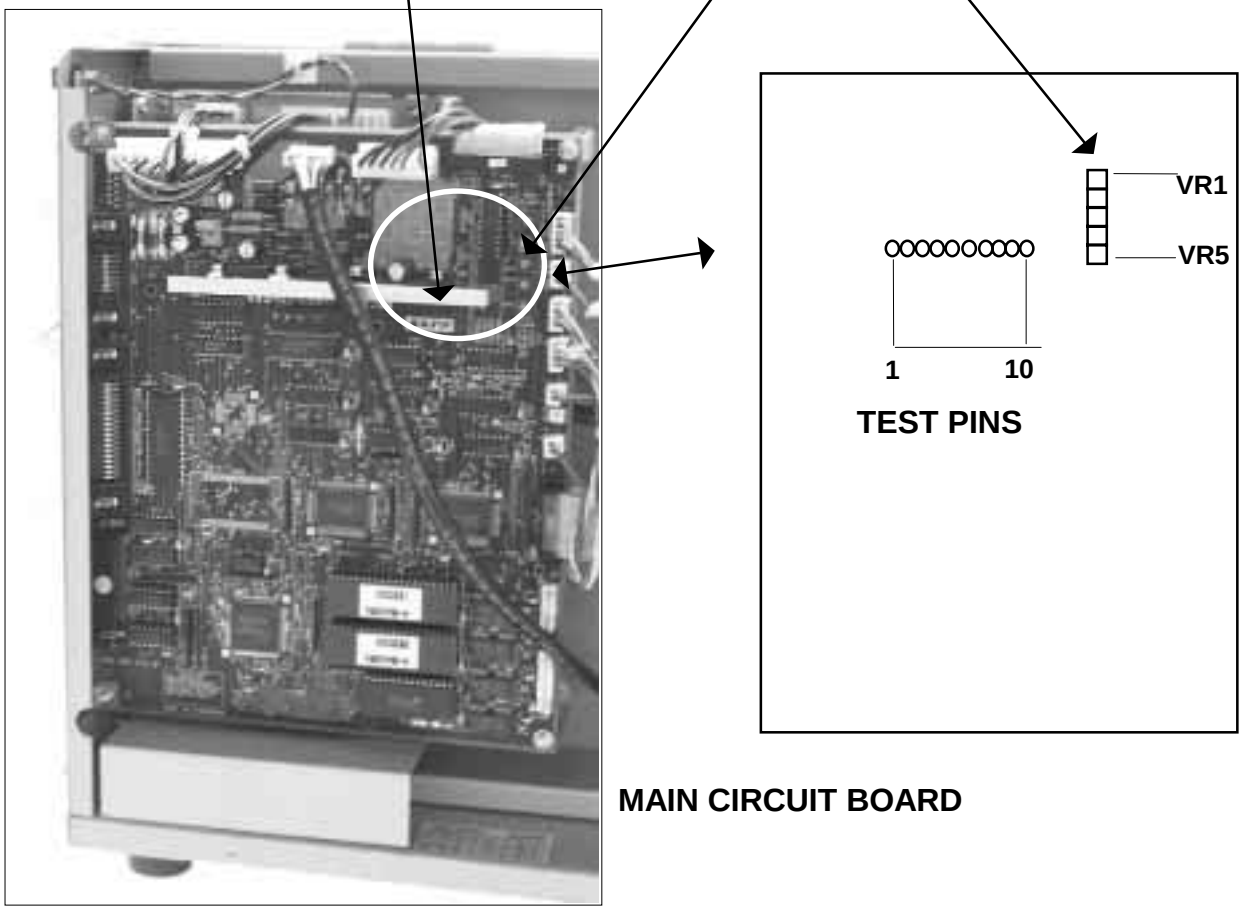


Fig. 4-6

4-4 Reflective "(Eye) I-Mark" Label Pitch Sensor Adjustment

Required Equipment:	• Number 2 Phillips Screwdriver • DC Voltmeter - Digital preferred, w/ small alligator clip voltage probes • Small flathead screwdriver (for potentiometer adjustment)

NOTE: Dip Switch setting for DSW2-2 (Select "I-Mark" must be in the ON position for using this procedure.

To adjust the Reflective Label Pitch Sensor voltage, perform the following steps:

STEP	PROCEDURE
	Refer to Section 4.2 for steps prior to adjustment
1.	Load a roll of label stock with a black ink "I-Mark" into the printer. Leave the print head/lock lever in the OPEN (up) position.
2.	On the main circuit board, turn VR1 clockwise to the maximum position. Refer to ***Fig. 4-7.***
3.	Attach the DC voltmeter negative lead (small alligator clip recommended) to pin 1 (ground) of the test point pin array labeled CH on the main circuit board. Attach the DC voltmeter positive lead to pin 7 of the CH test point pin array.
4.	**LOW LEVEL ADJUSTMENT ("I-Mark"):** Position the label/tag in the sensors field of view. Refer to Section 1-7 for sensor location. Be sure that the printed "I-Mark" **is not** in the sensors field of view. Adjust VR1 to set the voltage at approximately 0.8 volts or less.
5.	**HIGH LEVEL ADJUSTMENT ("I-Mark"):** Reposition the label/tag so the black printed "I-Mark" (on the backside down) is in the sensors field of view. Check the voltage reading. If the voltage shown on your meter is 2.8 volts or more, no further adjustment is required. Go to Step 7.

4-4 Reflective "I-Mark" Label Pitch Sensor Adjustment (Cont.)

STEP	PROCEDURE
6.	If the HIGH LEVEL ADJUSTMENT voltage indicated in Step 5 is less than 2.8 volts, you must repeat Step 4 and adjust VR1 to a lower voltage value. The target value should be 2.0 Volts less than the high level voltage obtained in Step 5. If the difference between the values obtained in Steps 4 & 5 is less than 2.0 volts, your label stock may be out of spec. for proper operation of this printer. Contact your Sato Distributor for assistance.
7.	Test your adjustment by properly installing a roll of label or tags and a roll of ribbon. Power on the printer. With the printer OFF LINE, press the **FEED** key. One label or tag should feed and no error should be indicated on the display.

VR1 (PIN 1 & 7)
ROTATE CLOCKWISE

Fig. 4-7

4-5 See Thru (GAP) Pitch Sensor Adjustment

Required Equipment:	• Number 2 Phillips Screwdriver • DC Voltmeter - Digital preferred, w/ small alligator clip voltage probes • Small flathead screwdriver (for potentiometer adjustment)

NOTE 1: It is important to use pressure sensitive label stock that is rated for use with thermal transfer printers using see through (transmissive) sensing.

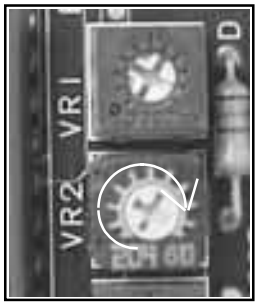
NOTE 2: Dip Switch setting for DSW2-2 must be in the OFF position for using this procedure.

To adjust the See Thru Pitch Sensor voltage, perform the following steps:

STEP	PROCEDURE
	Refer to Section 4.2 for steps prior to adjustment
1.	On the main circuit board, turn VR2 clockwise to the maximum position. Refer to ***Fig. 4-8.***
2.	Attach the DC voltmeter negative lead (small alligator clip recommended) to pin 1 (ground) of the test point pin array labeled CH on the main circuit board. Attach the DC voltmeter positive lead to pin 8 of the CH test point of the main circuit board.
3.	**LOW LEVEL ADJUSTMENT (GAP):** If you are using adhesive labels, remove the label face stock from its backing paper. Position the backing paper, in the sensors field of view. Refer to Section 1-7 for sensor location. If you are using a notched tag, position the tag so the notch is located in the sensor's field of view. Adjust VR2 to set the voltage at approximately 1.0 volts or less.

4-5 See Thru (GAP) Pitch Sensor Adjustment (Cont.)

STEP	PROCEDURE
4.	**HIGH LEVEL ADJUSTMENT (GAP)**: If you are using adhesive labels, position the complete label (face stock attached to the backing), in the sensors field of view. If using a tag, position the tag so the notch **is not** in the sensors field of view. Check the voltage reading. If the voltage shown on your meter is 3.0 volts or more, no further adjustment is required. Go to Step 6.
5.	If the HIGH LEVEL ADJUSTMENT voltage indicated in Step 4 is less than 3.0 volts, you must repeat Step 3 and adjust VR2 to a lower voltage value. The target value should be 2.0 volts less than the high level voltage obtained in Step 4.
6.	Test your adjustment by properly installing a roll of label or tags and a roll of ribbon. Power on the printer. With the printer OFF LINE, press the **FEED** key. One label or tag should feed and no error should be indicated on the display.



VR2 (PIN 1 & 8)
ROTATE CLOCKWISE

Fig. 4-8

4-6 Ribbon Sensor Adjustment

Required Equipment:	• Number 2 Phillips Screwdriver • DC Voltmeter • Small flathead screwdriver (for potentiometer adjustment)

STEP	PROCEDURE
	Refer to Section 4.2 for steps prior to adjustment
1	Connect the printer AC power cord to a grounded AC outlet. Place the power switch in the ON position.
2.	On the main circuit board, turn VR4 clockwise to the maximum position. Refer to ***Fig. 4-9.***
3.	Attach the DC voltmeter negative lead to pin 1 of the test point labeled CH (Ground) on the main circuit board. Attach the DC voltmeter positive lead to pin 10 of the CH test point of the main circuit board.
4.	Turn the ribbon unwind boss spindle slowly until the lowest possible voltage reading is displayed on the voltmeter. If the voltage reading is not equal to or less than +0.5 VDC, adjust VR4 to obtain that reading.

NOTE: Ribbon does not need to be loaded for this adjustment.

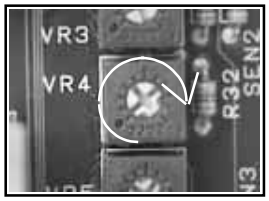
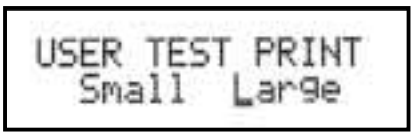
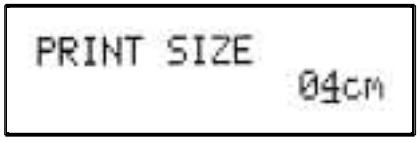


Fig. 4-9 **VR4 (PIN 1 & 10) ROTATE CLOCKWISE**

4-7 Pitch Offset Adjustment (User)

(Use Pitch VR to adjust print position and Offset VR to adjust stop position.)

Required Equipment:	Small flathead screwdriver (for potentiometer adjustment)

STEP	PROCEDURE
1.	On the front panel, turn the Pitch VR to the center position. Refer to ***Fig. 4-10.***
2.	Turn the power on while pressing the **FEED** key.
3.	Press the **LINE** key to set the cursor on **Small.** 
4.	Press the **FEED** key once. Verify display: 
5.	Press the **LINE** key to adjust the print width.
6.	Press the **FEED** key to initiate test printing. Press **FEED** key again to stop printing.
7.	Adjust Pitch VR while confirming with scale on test print. Repeat Step 6 if necessary.
8.	After adjusting, turn the power off.

Tolerance of Pitch VR: +/- 3.75 mm.

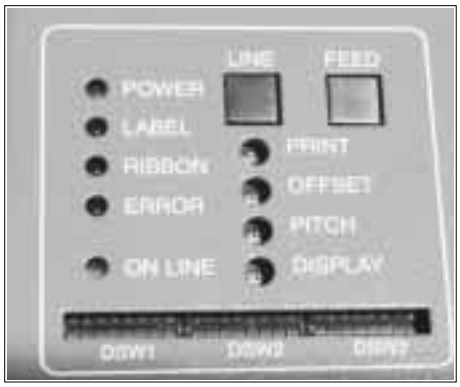


Fig. 4-10

4-8 Pitch Offset Adjustment (Service)

(Use Pitch VR to adjust print position and Offset VR to adjust stop position.)

Required Equipment:	Small flathead screwdriver (for potentiometer adjustment)

STEP	PROCEDURE
1.	Turn the Pitch VR to the center position on the front panel and VR5 on the main PCB to the center position. Refer to ***Fig. 4-11 & 4-12.***
2.	Place the print head in the open position and the DSW2-5 on the front panel in the ON position.
3.	Turn on the power while pressing the **LINE & FEED** keys. Release when an audible tone is heard.
4.	Place the print head back in the closed position and DSW2-5 in the OFF position. Verify display: "Factory Mode"
5.	Press the **FEED** key once and verify display.
6.	Press the **FEED** key once.
7.	Press the **LINE** key to initiate test printing. Press **FEED** key again to stop printing.
8.	Adjust VR5 on main PCB while confirming with scale on test print. Repeat Step 6 if necessary.
9.	Press FEED key to stop test print, then turn the power off.

COUNTER CLEAR
NON HEAD

Tolerance of VR5 on main PCB: +/- 3.75 mm.

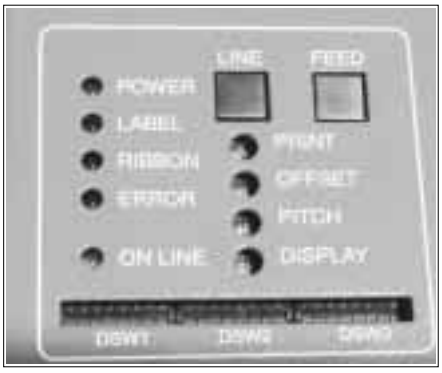


Fig. 4-11

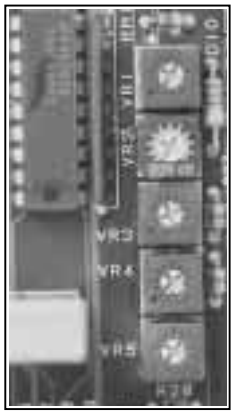


Fig. 4-12

4-9 Feed/Backfeed Adjustment -Tear Off Mode

(Use Offset VR to adjust label stop position)

Required Equipment:	Small flathead screwdriver (for potentiometer adjustment)

STEP	PROCEDURE
1.	Turn the OFFSET VR on the front panel to the center position. Refer to ***Fig. 4-13.***
2.	Turn the power on while pressing the **FEED** key.
3.	Press the **LINE** key to set the cursor on **Small.** USER TEST PRINT Small Large
4.	Press the **FEED** key once. Verify display: PRINT SIZE 04cm
5.	Press the **LINE** key to adjust the print width.
6.	Press the **FEED** key to initiate test printing. Press **FEED** key again to stop printing.
7.	Turn OFFSET VR to adjust label stop position.
8.	Press **FEED** key to stop test print, then turn the power off.

Tolerance of OFFSET VR: +/- 3.75 mm.

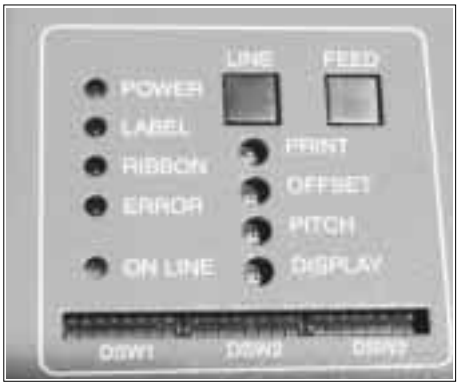
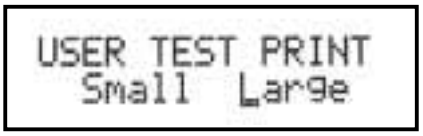


Fig. 4-13

4-10 Feed/Backfeed Adjustment-Cutter Mode

(Use Offset VR to adjust label stop position)

Required Equipment:	Small flathead screwdriver (for potentiometer adjustment)

STEP	PROCEDURE
1.	Turn the OFFSET VR on the front panel to the center position. Refer to ***Fig. 4-14.***
2.	Turn the power on while pressing the **FEED** key.
3.	Press the **LINE** key to set the cursor on **Small.** 
4.	Press the **FEED** key once. Verify display:
5.	Press the **LINE** key to adjust the print width.
6.	Press the **FEED** key to initiate test printing. Press **FEED** key again to stop printing.
7.	Adjust label cut position with OFFSET VR in the right position
8.	Press **FEED** key to stop test print, then turn the power off.

Tolerance of OFFSET VR: +/- 3.75 mm.

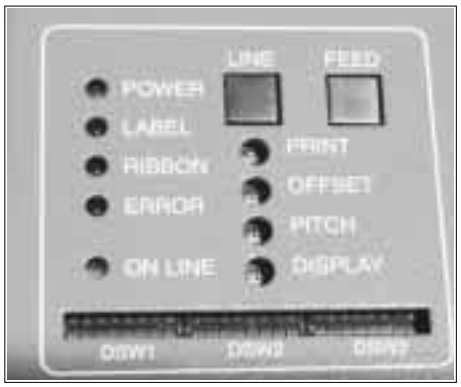


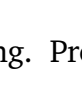
Fig. 4-14

4-11 Feed/Backfeed Adjustment-Dispenser Mode

(Use Offset VR to adjust label stop position)

Required Equipment:	Small flathead screwdriver (for potentiometer adjustment)

STEP	PROCEDURE
1.	Turn the OFFSET VR on the front panel to the center position. Refer to ***Fig. 4-15.***
2.	Turn the power on while pressing the **FEED** key.
3.	Press the **LINE** key to set the cursor on **Small.**
4.	Press the **FEED** key once. Verify display:
5.	Press the **LINE** key to adjust the print width.
6.	Press the **FEED** key to initiate test printing. Press **FEED** key again to stop printing.
7.	Adjust dispensed label edge position with OFFSET VR in the right position
8.	Press **FEED** key to stop test print, then turn the power off.



Tolerance of OFFSET VR: +/- 3.75 mm.

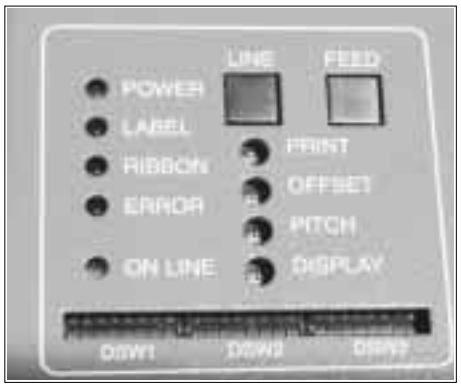


Fig. 4-15

Section

5

Mechanical Adjustments

5-1 Overview

The M-8400RV printer contains adjustable mechanical sub-assemblies. This means that during your regular maintenance, your service technicians are able to make adjustments to reset the printer to factory specifications thereby ensuring optimum performance of your printer.

The main mechanical sub-assemblies are:

- *Ribbon Unwind/Rewind Assembly*
- *Ribbon Guide Roller Assembly*
- *Print Head Assembly*
- *Drive Belt Assembly*

In this section you will find procedures for:

- *Ribbon Unwind and Rewind Clutch Adjustment*
- *Ribbon Guide Plate Adjustment*
- *Print Head Position Alignment*
- *Print Head Balance Adjustment*
- *Print Head Pressure Check*
- *Feed Roller Adjustment*
- *Pitch Sensor Modification*
- *Timing Belt Tension Adjustment*

5-2 Ribbon Clutch Adjustments

Excessive ribbon unwind and rewind tension will result in variable ribbon motion and could be the cause of print quality problems.

Follow the procedures 5-2.1 and 5-2.2 to verify that the ribbon unwind and rewind tensions are within specification or if adjustment of either clutch is necessary.

Required Equipment: FOR 5.2.1 & 5.2.2	• 1 Kg Tension Gauge • Ribbon Core, empty • String • 12 mm Wrench • #2 Phillips Screw Driver

5-2.1 Ribbon Unwind Clutch Adjustment

To adjust the Ribbon Unwind Clutch, perform the following steps and refer to the illustrations:

STEP	PROCEDURE
1.	Remove the ribbon if installed.
2.	Place an empty ribbon core on the ribbon unwind spindle. Attach the free end of the string to the tension gauge. Refer to ***Fig. 5-1, 5-2.***
3.	Wind the string tightly around the ribbon core in a single layer and in a counter clockwise direction. Attach the free end of the string to the tension gauge.
4.	Gradually lift the tension gauge, pulling the string to unwind it from core. Once the spindle begins to move, the gauge should indicate 300 to 400 grams of tension. Excessive or insufficient tension must be corrected by adjusting the ribbon unwind clutch. Refer to ***Fig. 5-1, 5-2.*** To adjust the clutch, loosen the set screw and move the adjust nut CW for more tension and CCW for less tension. Tighten the set screw and repeat Steps 3 and 4 until the correct tension is achieved.

5-2 Ribbon Clutch Adjustments

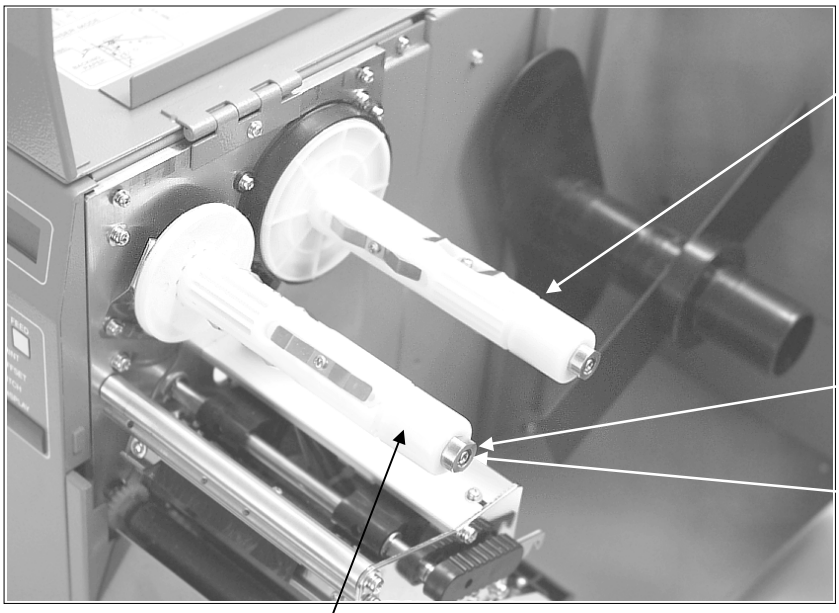


Fig. 5-1

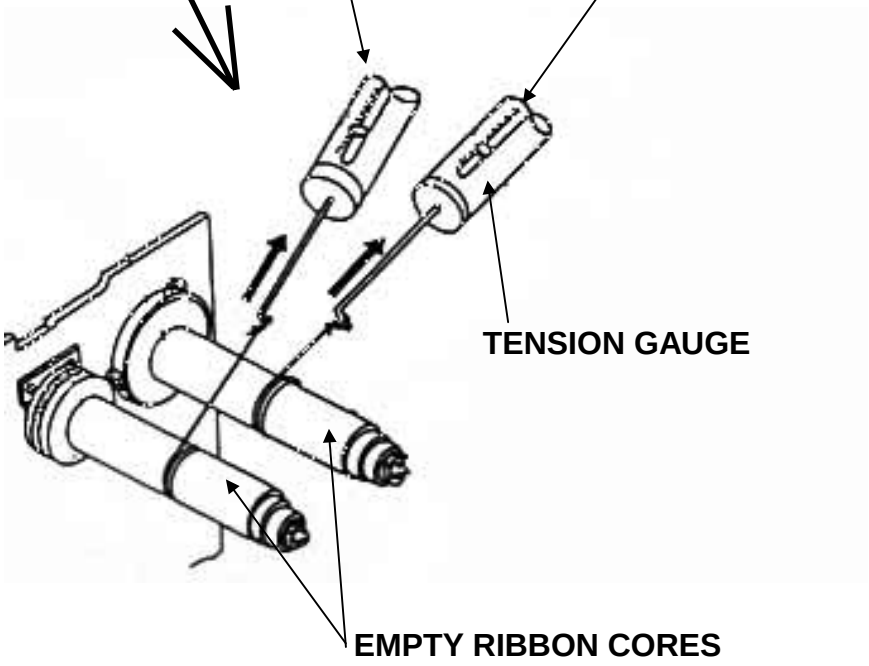


Fig. 5-2

5-2.2 Ribbon Rewind Clutch Adjustment

To adjust the Ribbon Wind Clutch, perform the following steps and refer to the illustrations on previous page:

STEP	PROCEDURE
1.	Connect the power cable to the printer and AC outlet. Place the printer's power switch to the ON position.
2.	Place an empty ribbon core on the ribbon wind spindle Attach the free end of the string to the tension gauge. Refer to ***Fig. 5-1.***
3.	Wind the string tightly around the ribbon core in a single layer and in a counter clockwise direction. Attach the free end of the string to the tension gauge.
4.	Gradually lift the tension gauge, pulling the string to unwind it from the core. Once the spindle begins to move, the gauge should indicate from 600 to 800 grams of tension. Excessive or insufficient tension must be corrected by adjusting the ribbon unwind clutch. Refer to ***Fig. 5-1, 5-2.***
	To adjust the clutch, loosen the set screw and move the adjust nut CW for more tension and CCW for less tension. Tighten the set screw and repeat Steps 3 and 4 until the correct tension is achieved.

5-3 Ribbon Guide Plate Adjustment

Required Equipment:	• #2 Phillips Screw Driver • Flat blade Screw Driver

If the ribbon is not smooth across the guide plate (ribbon wrinkle), and adjustment is required, perform the following steps:

STEP	PROCEDURE
1.	Check for even ribbon tension by watching the ribbon movement under the guide plate as it moves upward toward the ribbon rewind spindle. If it appears uneven, (wrinkles) proceed to Step 2. Refer to ***Fig. 5-3.***
2.	Reposition and adjust the ribbon guide plate by loosening two screws and moving the plate with a flat blade screw driver. Refer to ***Fig. 5-4.***

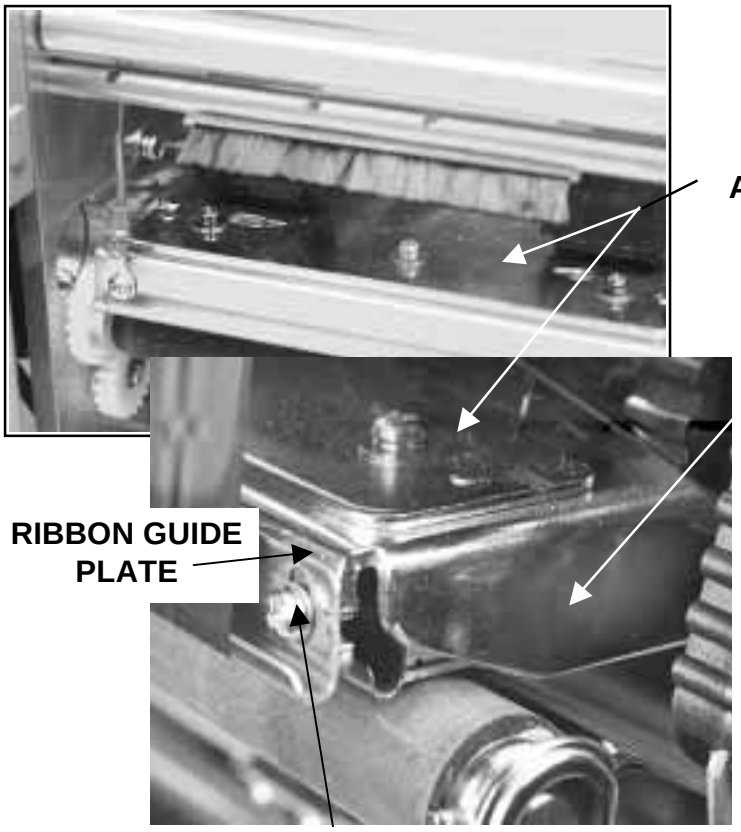


Fig. 5.3

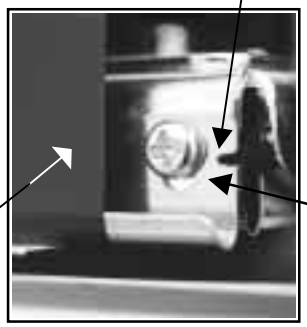


Fig. 5-4

5-4 Print Head Position Alignment

Required Equipment:	#2 Phillips Screwdriver

To adjust the print head alignment, and make print quality consistent across label, perform the following steps:

STEP	PROCEDURE
1.	Loosen the (1) center and (2) side screws attaching the head adjustment plate to the head.
2.	Slide head adjustment plate forward and backward, aligning the center index scale as a guide to adjust. Tighten the screws. NOTE: Use the printed head pattern as a guide to even print position. Refer to Section 8.7.

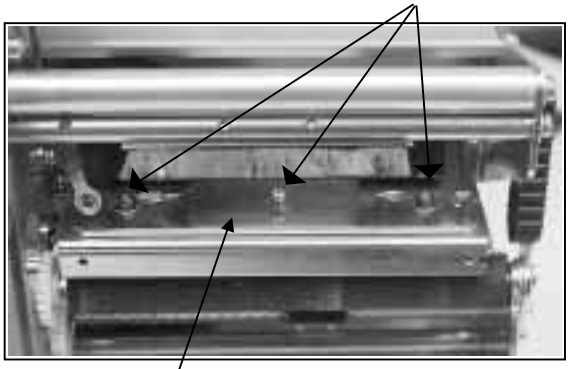


Fig.5-5

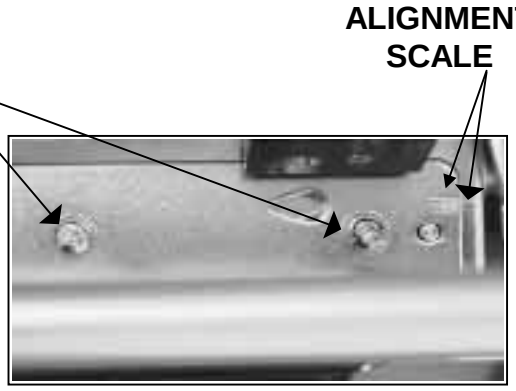


Fig. 5-6

REFER TO SECTION 8.7 FOR HEAD PATTERN EXAMPLES

5-5 Print Head Balance Adjustment

Required Equipment:	• #2 Phillips Screwdriver

To further optimize print quality, especially when using thick label stock, additional adjustments are possible. Perform the following steps, using head pattern as a guide:

STEP	PROCEDURE
1.	Load the ribbon and label stock into the printer.
2.	Loosen screw near the bottom of the plate.
3.	Rotate adjusting screw to achieve optimum print quality along the length of the print head. NOTE: Rotating screw CW places pressure on the inside end (left side) of the print head creating a darker impression on that surface. Rotating screw CCW places pressure on the outside end (right side) of the print head creating a darker impression on that surface.

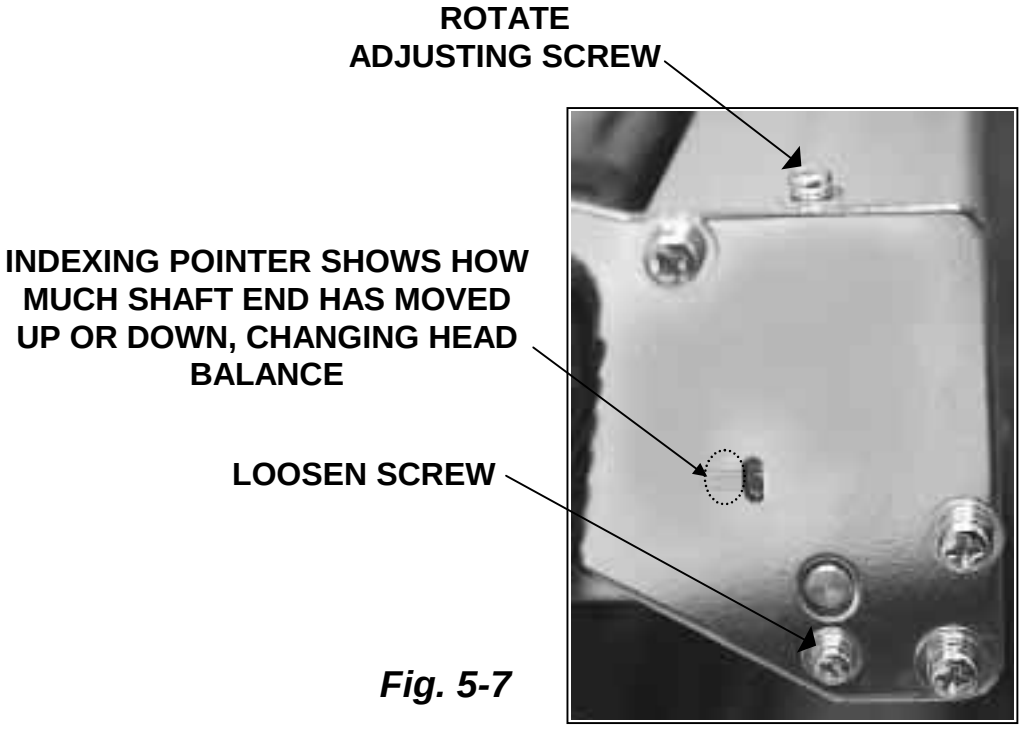

ROTATE
ADJUSTING SCREW
INDEXING POINTER SHOWS HOW MUCH SHAFT END HAS MOVED UP OR DOWN, CHANGING HEAD BALANCE
LOOSEN SCREW

Fig. 5-7

5-6 Print Head Pressure Check

Required Equipment:
- #2 Phillips Screwdriver
- 5Kg Tension Gage

STEP	PROCEDURE
1.	Remove the ribbon if installed.
2.	Load label stock into printer.
3.	Remove (2) screws to detach ribbon guide plate from print head bracket. ***Fig. 5-8***.
4.	Fasten a length of cord to both ends of the head bracket and attach to the tension gage. Gradually pull upward on gage while gently pulling forward on the label stock. ***Fig. 5-9***. Note tension reading when label stock just begins to move forward as a result of the pulling force. If the tension reading is not within the specified range of 3-3.5Kg, the print head spring plates must be replaced. *THERE IS NO ADJUSTMENT OF THE PRINT HEAD TENSION.*

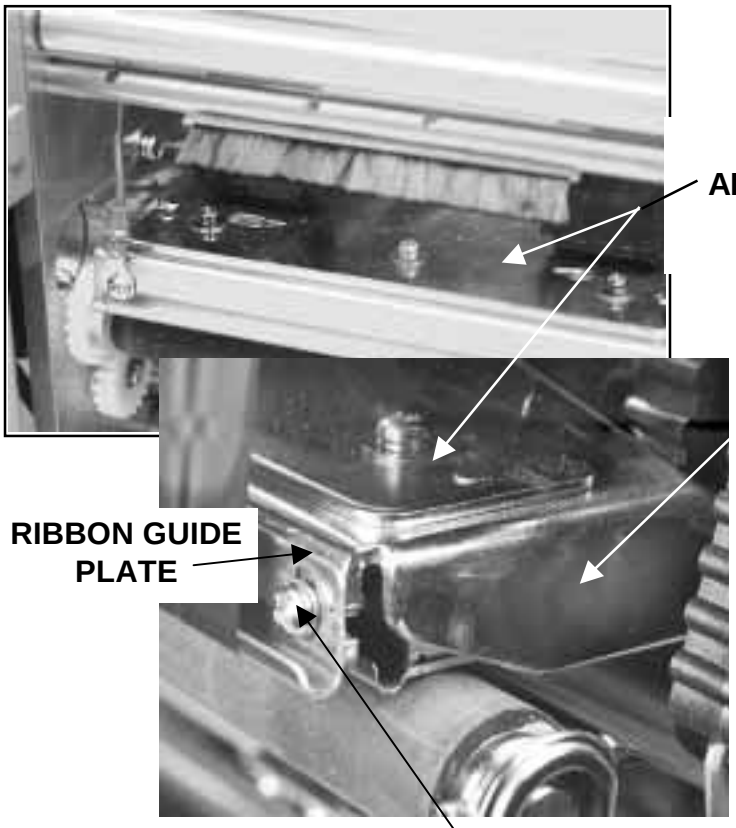


Fig. 5-8

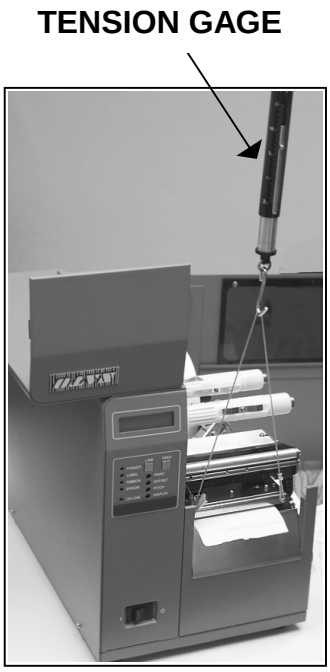


Fig. 5-9

5-7 Feed Roller Adjustment (Label Tracking Adjustment)

Required Equipment:
- #2 Phillips Screwdriver
- Small Flat Blade Screwdriver

STEP	PROCEDURE
1.	Load the ribbon and label stock into the printer.
2.	Loosen (2) screws. Insert flat blade screwdriver in slot and rotate CW or CCW. Rotating CW moves the Feed Roller Assembly backward and labels will track to the outside. Rotating CCW moves the Feed Roller Assembly forward and labels will track towards the inside. Refer to ***Fig. 5-10***. Tighten the (2) screws after adjusting.
3.	Eventually, fine tuning may be required. To increase pressure between the upper and lower rollers, adjust the two screws on the media lid. Refer to ***Fig. 5-11***.

5-7 Feed Roller Adjustment (Label Tracking Adjustment)

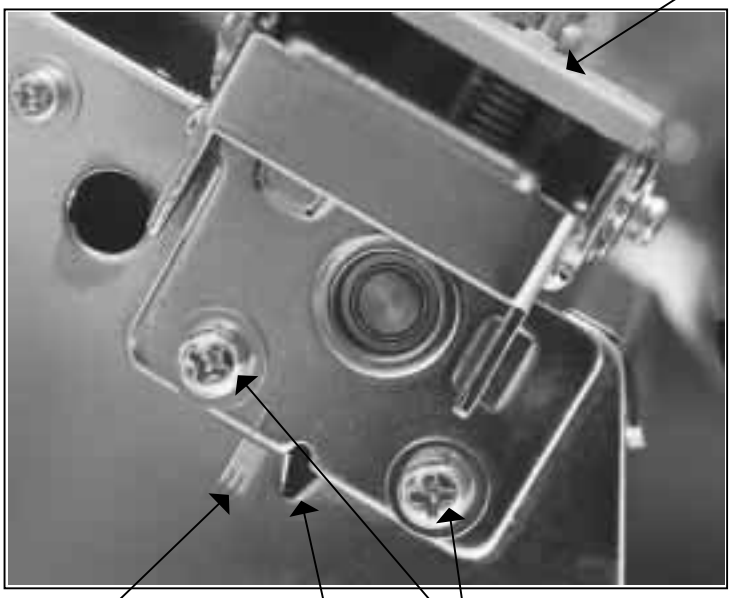


Fig. 5-10

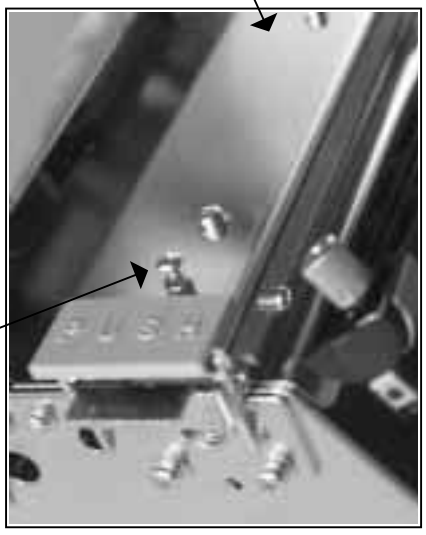


Fig. 5-11

5-8 Pitch Sensor Modification for Sensing "R - Corner" Notch Tags

Required Equipment:	• Snap Ring Remover Tool • #2 Phillips Screwdriver

STEP	PROCEDURE
1.	Remove (2) screws holding the label tear off cover to the printer. Rotate the cover down, then remove it by lifting up. Refer to ***Fig.5-12.***
2.	Remove the E-Snap Ring from rod to allow sensor the full range of adjustment. Refer to ***Fig.5-13.***
3.	Replace label tear off cover.

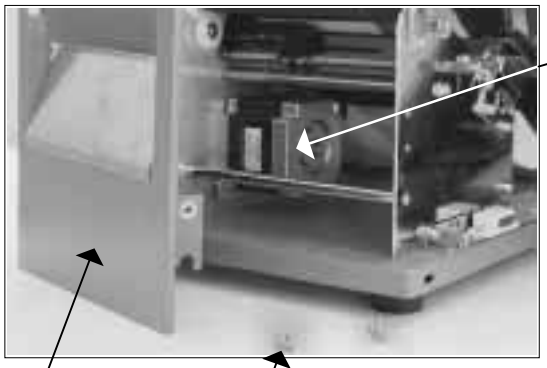


Fig. 5-12

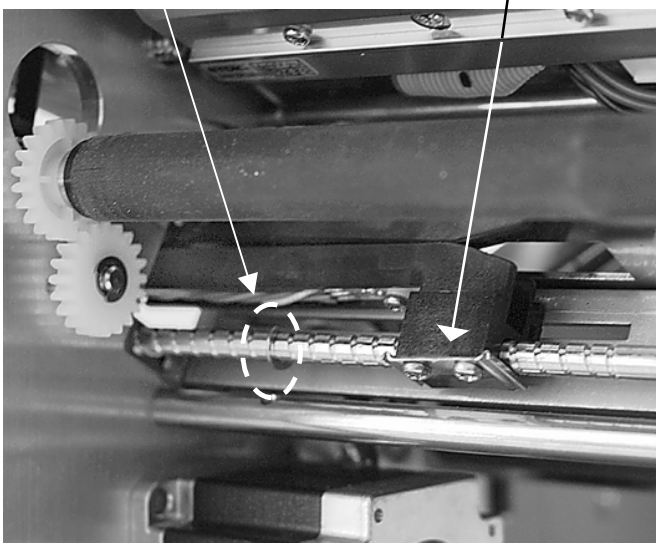


Fig. 5-13

5-9 Timing Belt Tension Adjustment

Required Equipment:	• 1Kg Tension Gauge • #2 Phillips Screwdriver

STEP	PROCEDURE
1.	Pull the center of each timing belt with the tension gauge and note the tension reading when the belt is moved 1 to 2mm. If the tension reading of each belt is not within range of 100 - 300g, the stepper motor mounting screws must be loosened to adjust the motor pulley.
2.	To gain access to the motor, remove (2) screws holding the label tear off cover to the printer. Rotate the cover down, then remove it by lifting up. ***Fig. 5-14.***
3.	Loosen the (2) stepper motor mounting screws and move motor to achieve the required range. Tighten but do not over tighten screws. Belts should have some movement. Replace label tear off cover. ***Fig. 5-15.***

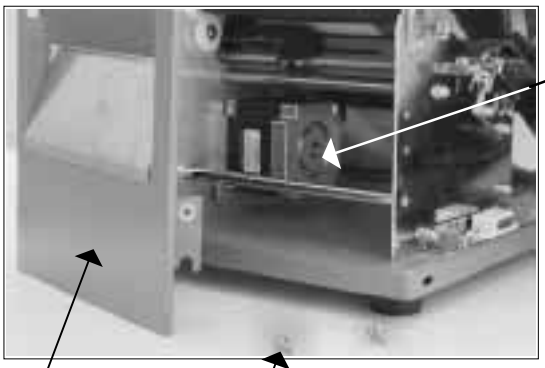


Fig. 5-14

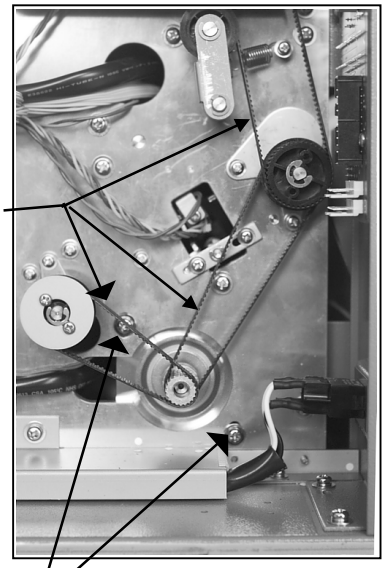
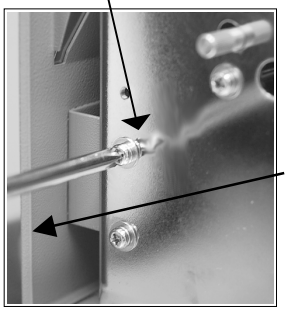


Fig. 5-15



Section

6

Replacement Procedures

6-1 Overview

The SATO M-8400RV printer contains replaceable components and sub-assemblies. This chapter contains step-by-step instructions for removing and replacing the following components and sub-assemblies.

- *Fuses*
- *Print Head*
- *Main Circuit Board*
- *Power Supply*
- *Label Sensor*
- *Ribbon Motion Sensor*
- *Ribbon Clutch Washers*
- *Timing Belts*
- *Platen*
- *Display Panel*
- *Stepper Motor*

6-2 Replacing Fuses

Fuse replacement is described in the following section.

- *6.2.1 Removing and Replacing the Main Power Fuse*
- *6.2.2 Removing and Replacing the +5V Fuse*
- *6.2.2 Removing and Replacing the +24VDC External Fuse*

> **NOTE:** Before replacing a fuse, determine the cause of the overload condition.

6-2.1 Removing and Replacing the Main Power Fuse

Required Equipment: T3.15 Amp, 250 V Fuse

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	On the back of the printer locate the fuse cap. Unscrew the cap and remove the defective fuse.
3.	Replace the fuse with one of equal rating (T3.15 Amp, 250 V). ***Do not use a fuse with a higher rating. Fig.6-1.***
4.	Screw the fuse cap back and connect the power cable.

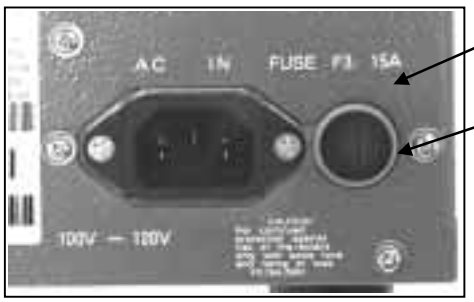


Fig. 6-1

6-2.2 Removing and Replacing the +5V Or +24V FUSE(s)

Required Equipment:	• 1 Amp, 250 V Fuse (+5V) or • 3 Amp, 250 V Fuse (+24VDC) • #2 Phillips Screwdriver

To remove and replace the Main Power Fuse, perform the following steps:

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer. Remove (2) screws holding the LH cover to the printer base at the outside of the printer and remove the cover to expose the main PCB. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Refer to ***Fig. 6-2*** and locate the +5V Fuse (F2) or +24V Fuse (F1).
5.	Remove and replace the Fuse(s) with one of equal rating. ***Do not use a fuse with a higher rating.***
6.	Close the door and lid and secure cover with screws removed in Step 3.
7.	Return the printer to service by reconnecting the power cable.

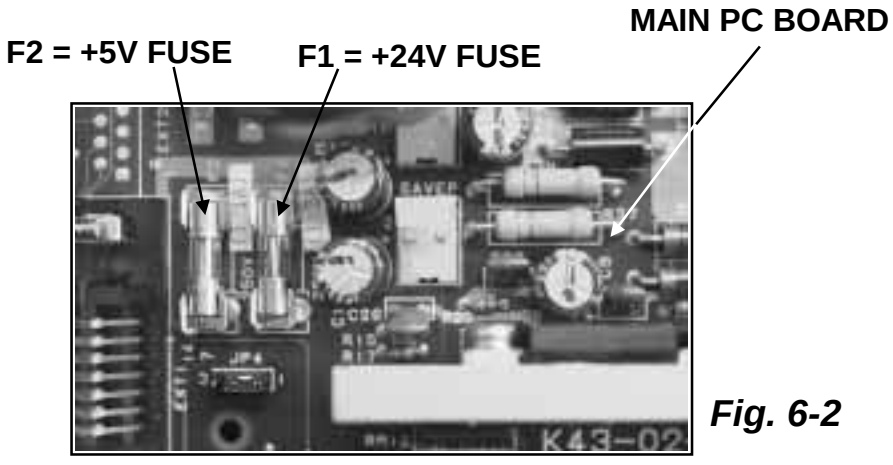


Fig. 6-2

6-3 Replacing the Print Head

If the M-8400RV print head becomes damaged for any reason, it can be easily removed and replaced. No critical adjustments are required. Before you replace the print head, check the head counter values by printing a test pattern.

Required Equipment: #2 Phillips screwdriver

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Remove (2) screws securing Label Tear Off Cover. Rotate forward and lift to remove. ***Fig. 6-3.***
4.	Remove the ribbon and label stock if installed.
5.	Remove the center screw. ***Fig. 6-4.***
6.	Carefully open the print head so that it will drop down.
7.	Carefully disconnect the cables and remove the print head.
8.	Install the new print head by reconnecting the print head data cable and the print head power cable to the print head. ***Fig. 6-5, 6.6.***
9.	Position the print head so the center screw is aligned with the mechanism and the alignment pins are aligned with the head. Replace center screw and (1) side screw. Tighten securely.
10.	Replace label tear off cover and close doors.

Before you return the printer to normal service, you should perform the following procedures:

- Clear Counter Heads (Refer to Section 7-4).
- Confirm that the head cables are connected and that it does not touch the head opening spring. Also confirm that you can open and close the head without restriction and that the ribbon guide plate adjustment is correct.
- Print test pattern.

6-3 Replacing the Print Head

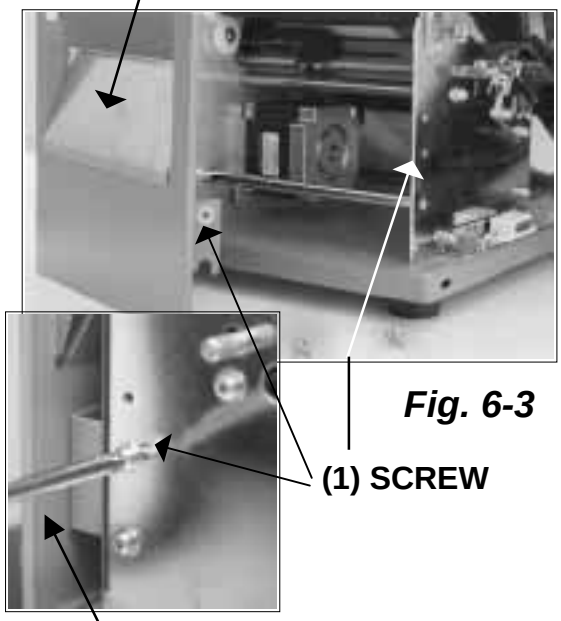


Fig. 6-3

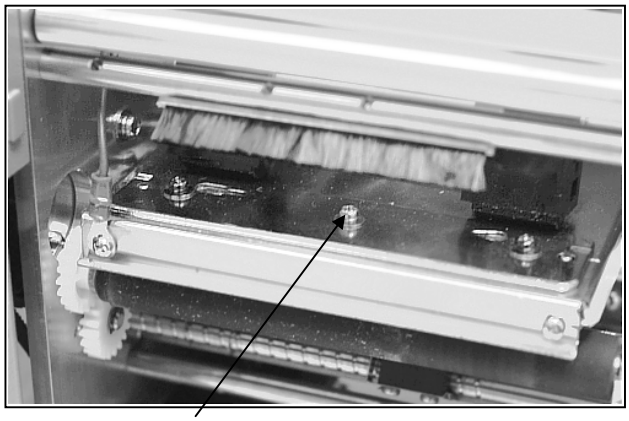
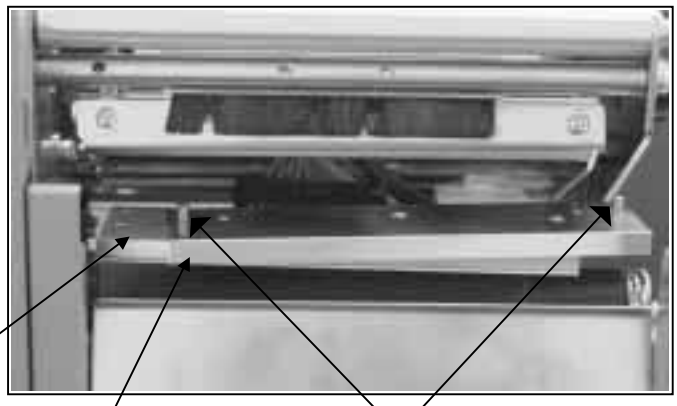


Fig. 6.4



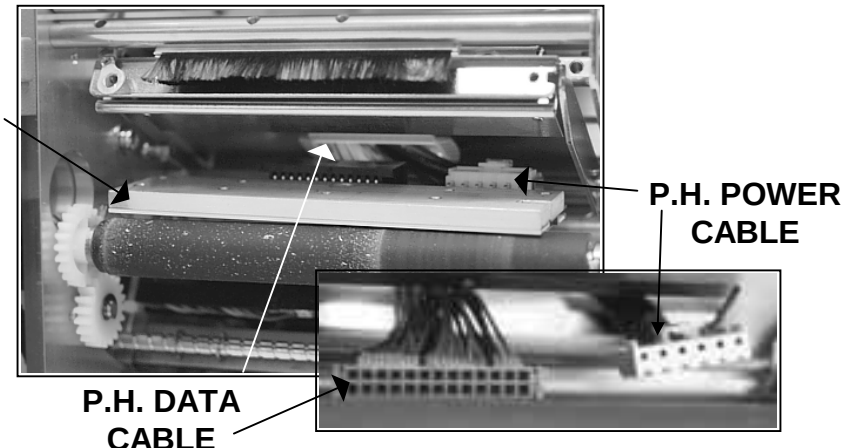


Fig. 6-5, 6-6

6-4 Replacing the Main Circuit Board

The Main Circuit Board contains the control electronics for the M-8400RV and is located behind the LH cover of the printer.

NOTE: Many of the components on these boards are extremely susceptible to damage by static electricity. To avoid damage from static electricity, do not unpack new circuit boards from anti-static bags until instructed to do so.

Required Equipment: #2 Phillips Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover to expose the PCB. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Note cable connections locations, then disconnect all cables from the PCB board. ***Fig. 6-7***.
5.	Remove (4) screws to detach the PCB from the printer. ***Fig. 6-7***.
6.	Carefully remove the EPROM(s) from the defective PCB and install in the same location(s) on the new PCB. ***Fig. 6-7***. Note: Make sure the marks on the EPROM(s) are aligned correctly with the socket.
7.	Reinstall the PCB using screws previously removed. Reattach the cables.
8.	Close the door and lid and secure cover with screws removed in Step 3.
9.	Return the printer to service by reconnecting the power cable.
10.	Reset printer to factory defaults by following the Factory Default Procedure.

6-4 Replacing the Main Circuit Board

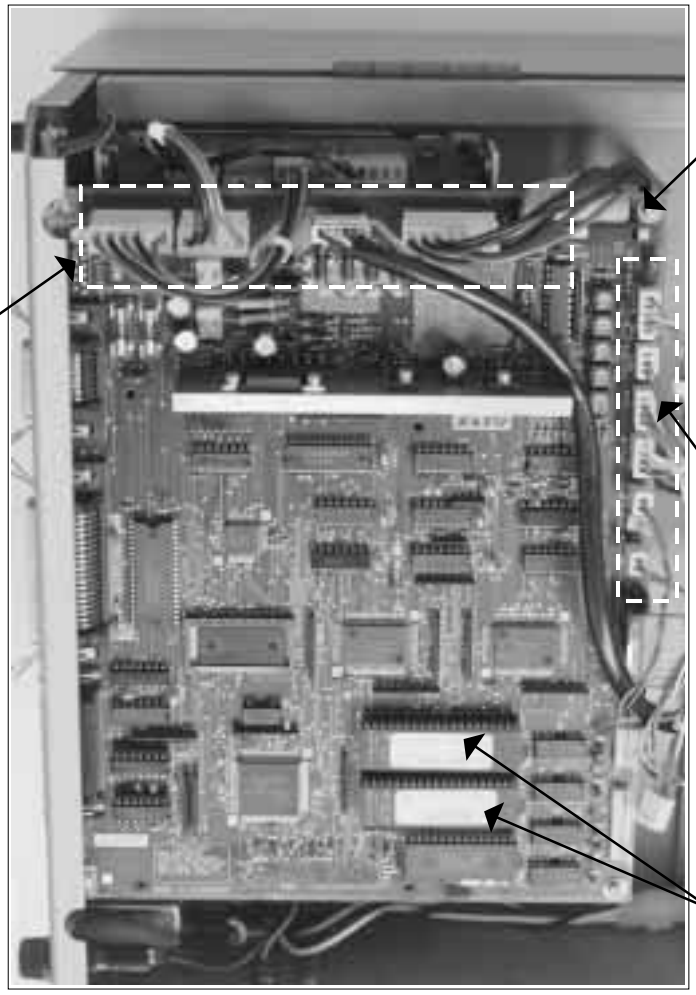


Fig. 6-7

6-5 Replacing the Power Supply

The M-8400RV Power Supply is a non-repairable component with no service parts and is replaced as a complete assembly.

Required Equipment:	#2 Phillips Screw Driver

To remove and replace the Power Supply, perform the following steps:

STEP	PROCEDURE
1.	Refer to Section 6-4 and detach the main circuit board for access to the power supply**.**
2.	Remove (2) screws from the mechanical side of the printer which fastens the power supply to the wall. ***Fig. 6-8***.
3.	Detach (3) cable connections and remove the defective unit. ***Fig. 6-8b***.
4.	Install the new power supply using screws previously removed. Reattach cable connections.
5.	Reattach PCB referring to Section 6-4.
6.	Close the door and lid and secure cover with screws removed in Step 2.

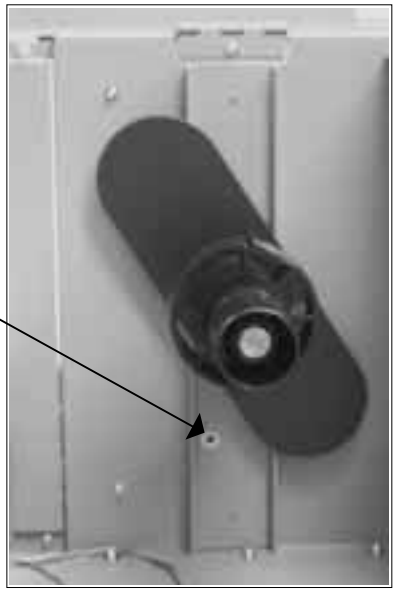


Fig. 6-8

6-5 Replacing the Power Supply

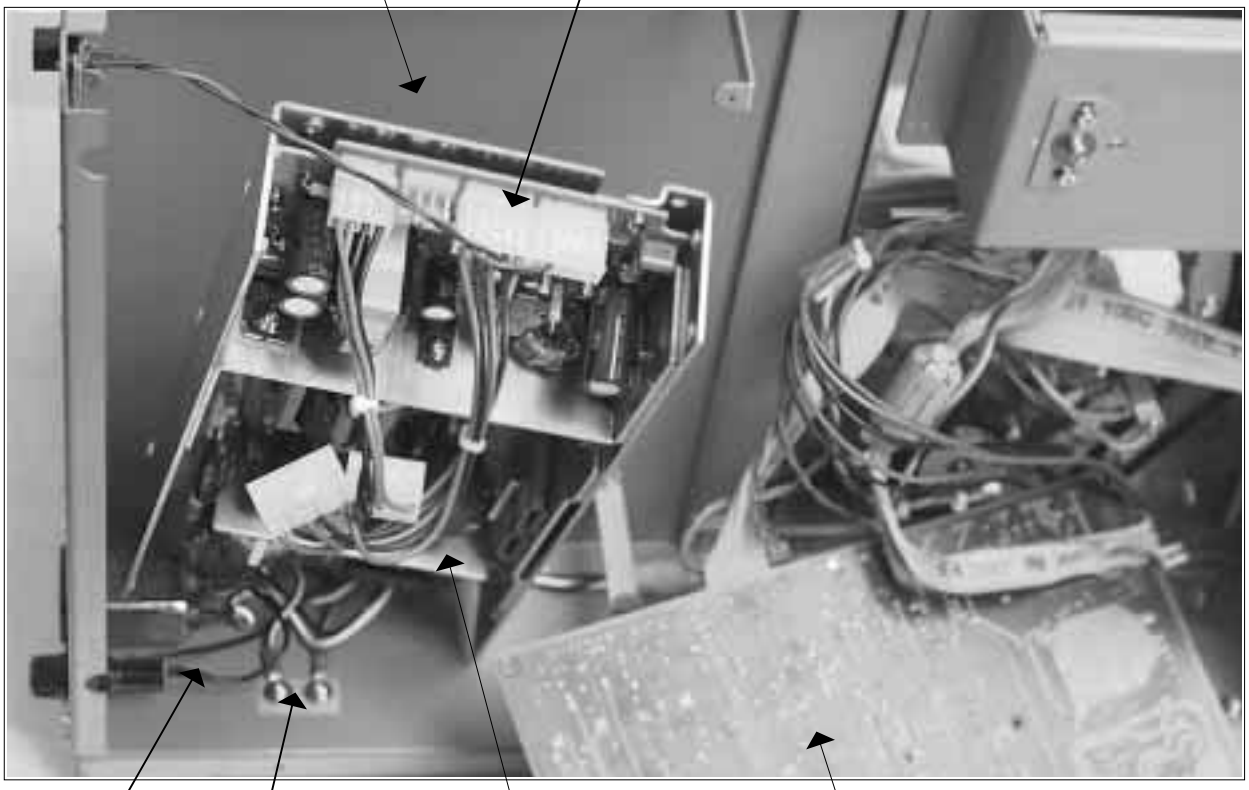


Fig. 6-8b

6-6 Replacing the Label Pitch Sensor Assembly

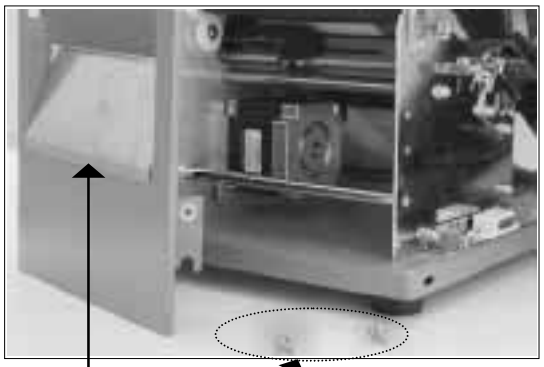
The Label Sensor Assembly can be removed from the printer to clear label fragments and for service. No critical alignment is required when replacing the sensors.

Required Equipment: #2 Phillips Screw Driver

To remove and replace the Label Sensor, perform the following steps and refer to the illustrations:

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the sensor module. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Remove (1) screw securing label tear off cover. Rotate forward and lift to remove. Refer to ***Fig. 6-9.***
5	Remove (2)screws from the bracket that holds the module to the side frame. ***Fig. 6-10, 6-11.***
6.	Carefully glide the sensor back out through the access opening. ***Fig. 6-10 & 6-12.***
7.	Detach (2) top connectors from the PCB to free the sensor from the printer. ***Fig. 6-13.***
8.	Remove (2) screws holding the spring plate to the shaft and sensor. ***Fig. 6-14.***
9.	Replace sensor module. Reattach spring plate to the shaft and sensor. Carefully slide the unit into the access hole of the back plate. The "T" extrusion of the module must fit into "T" slot of the side frame assembly. ***Fig. 6-15 & 6-16.*** Replace the bracket that holds the module to the side frame with (2) screws previously removed. Reattach cable connections.
10.	Upon completion of sensor installation, replace label tear off cover and the LH cover. Reconnect the power.

6-6 Replacing the Label Pitch Sensor Assembly



LABEL TEAR OFF COVER

Fig. 6-9

SIDE FRAME

LABEL COVER

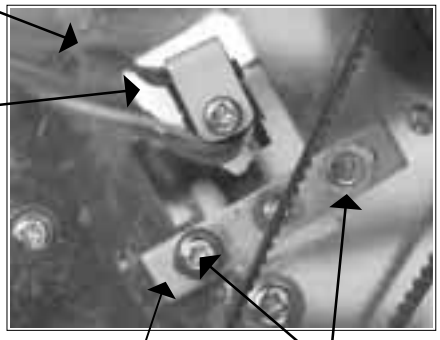
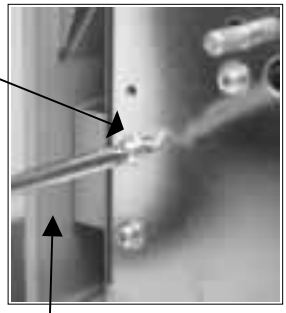


Fig. 6-10

BRACKET

(2) SCREWS

(1) SCREW



BACK SIDE OF LABEL TEAR OFF COVER

SIDE FRAME

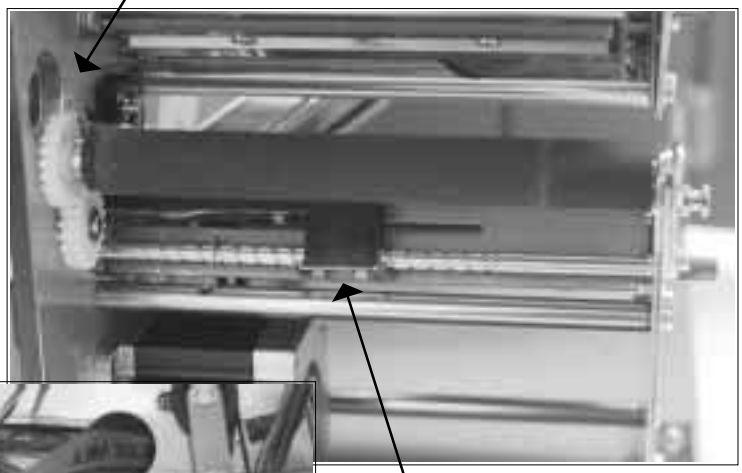
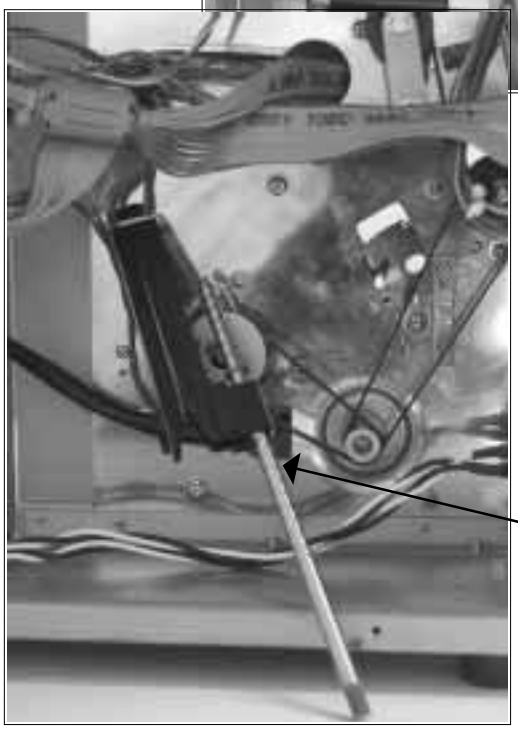


Fig. 6-11

LABEL PITCH SENSOR MODULE IN POSITION



SENSOR MODULE SHOWN REMOVED

Fig. 6-12

6-6 Replacing the Label Pitch Sensor Assembly

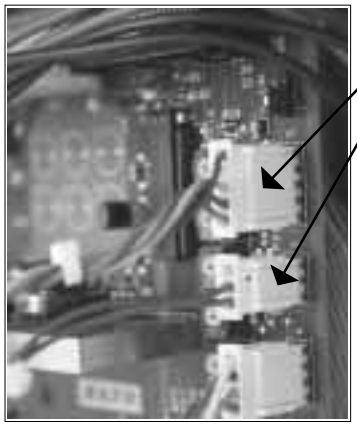


Fig. 6-13

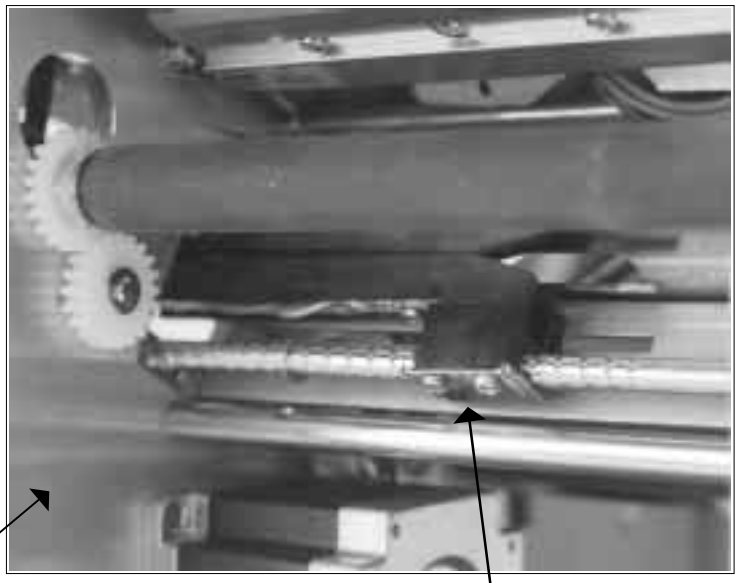


Fig. 6-14

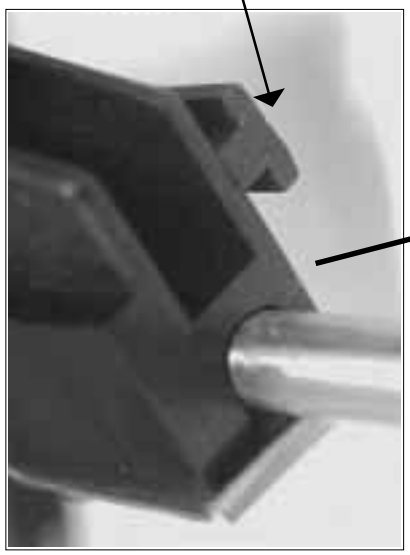


Fig. 6-15

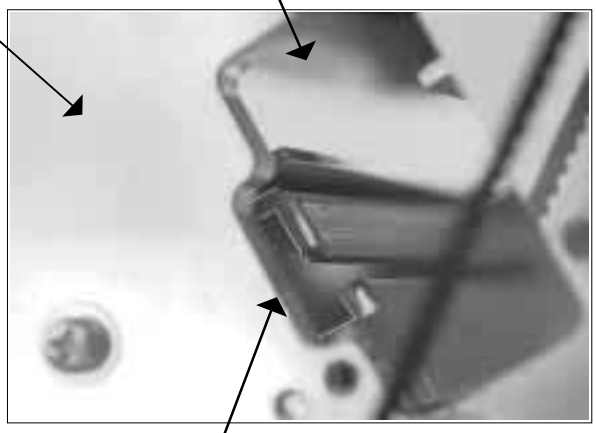


Fig. 6-16

6-7 Replacing the Label Out Sensor Assembly (Micro Switch)

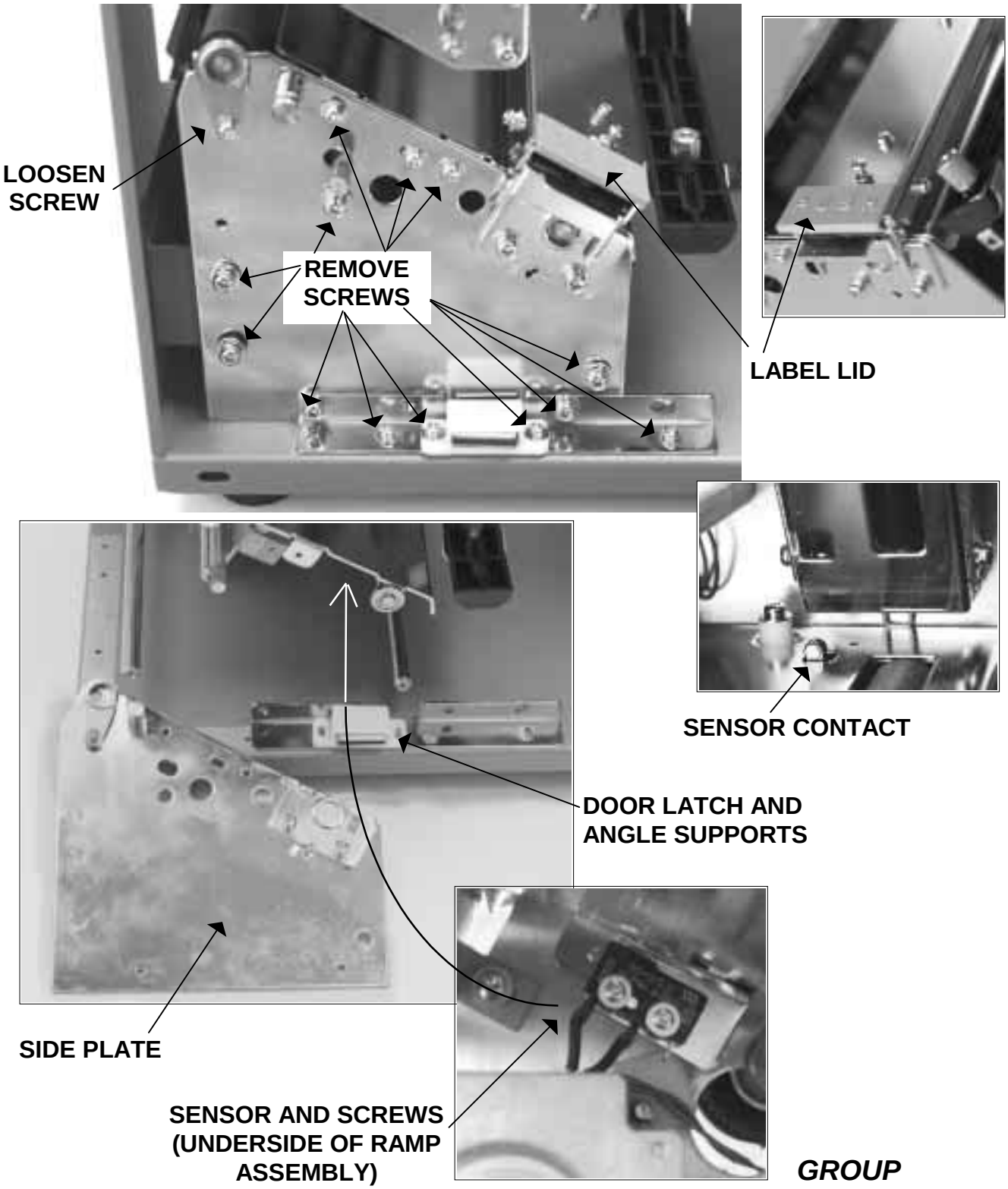
The Label Sensor Assembly can be removed from the printer to clear label fragments and for service. No critical alignment is required when replacing the sensors.

Required Equipment:	#2 Phillips Screw Driver

To remove and replace the Label Sensor, perform the following steps and refer to the illustrations:

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the sensor module. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Lift label lid to expose label out sensor switch.
	Refer to Fig. Group 6-16A and perform the following procedures:
5.	Remove screws indicated.
6.	Remove the door latch and angle supports. Carefully detach the side plate from the rest of the unit and set aside.
7.	Access the sensor under the Ramp Assembly and detach (2) screws from the motor.
8.	Install the new sensor module using screws previously removed.
9.	Carefully maneuver the side plate into position and replace screws removed in Step 5. Replace angle supports and door latch.
10.	Upon completion of sensor installation, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power.

6-7 Replacing the Label Out Sensor Assembly (Micro Switch)



GROUP
Fig. 6-16A

6-8 Replacing the Ribbon Motion Sensor

The Ribbon Motion Sensor is easily replaced for service.

Required Equipment:	#2 Phillips Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the sensor module. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Remove the unwind spindle shaft using procedure in Section 6-9. ***Fig. 6-17.***
5.	Remove sensor mounting screw. ***Fig. 6-17.***
6.	Unplug the SEN4 connector from the PCB and pull the sensor unit through the frame hole. ***Fig. 6-18.***
7.	Remove (2) screws holding sensor to the mounting bracket. ***Fig. 6-19.***
8.	Replace sensor and reattach to the mounting bracket. Feed sensor connector back through the frame hole and reattach to SEN4 on the PCB. Attach the sensor bracket to the frame. Replace the unwind spindle shaft referring to Section 6-9.
9.	Replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power.

6-8 Replacing the Ribbon Motion Sensor

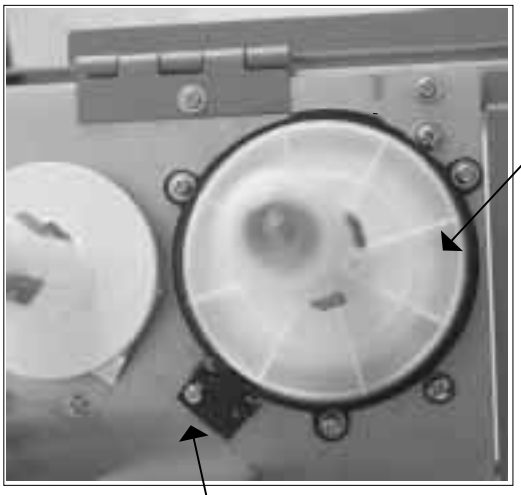


Fig. 6-17

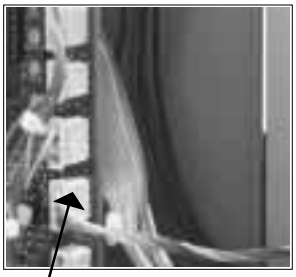


Fig. 6-18

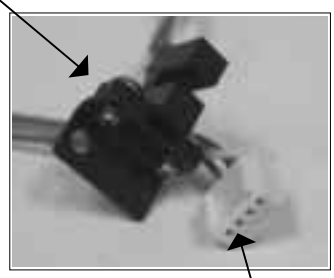


Fig. 6-19

6-9 Replacing the Ribbon Drive Clutch Washers

Both the ribbon unwind and the rewind drive spindles incorporate a friction clutch assembly to control tension. The friction washers within these clutch assemblies are replaceable. The procedure is identical for both the off-wind and the on-wind clutch assemblies.

Required Equipment:	#2 Phillips Screw Driver #12mm Open End Wrench

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the sensor module. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Remove the following parts from two spindle shafts (in order): Refer to ***Fig.6-21.***

ITEM N0.	DESCRIPTION	QTY EA ASSY
1.	Screw	(1)
2.	Adjustment Nut	(1)
3.	Stopper Collar	(1)
4.	Spring	(1)
5.	Disc	(1)
6.	Oil- less Dry Metal Washer	(1)
7.	Collar	(2)
8.	Ribbon Boss	(1)
9A & 9B	Disc Plate (Different)	(1)
10.	Friction Washer	(1)
11. Hold Plate		(1)

NOTE: Disassemble one spindle at a time so that the other can be used for reference.

6-9 Replacing the Ribbon Drive Clutch Washers

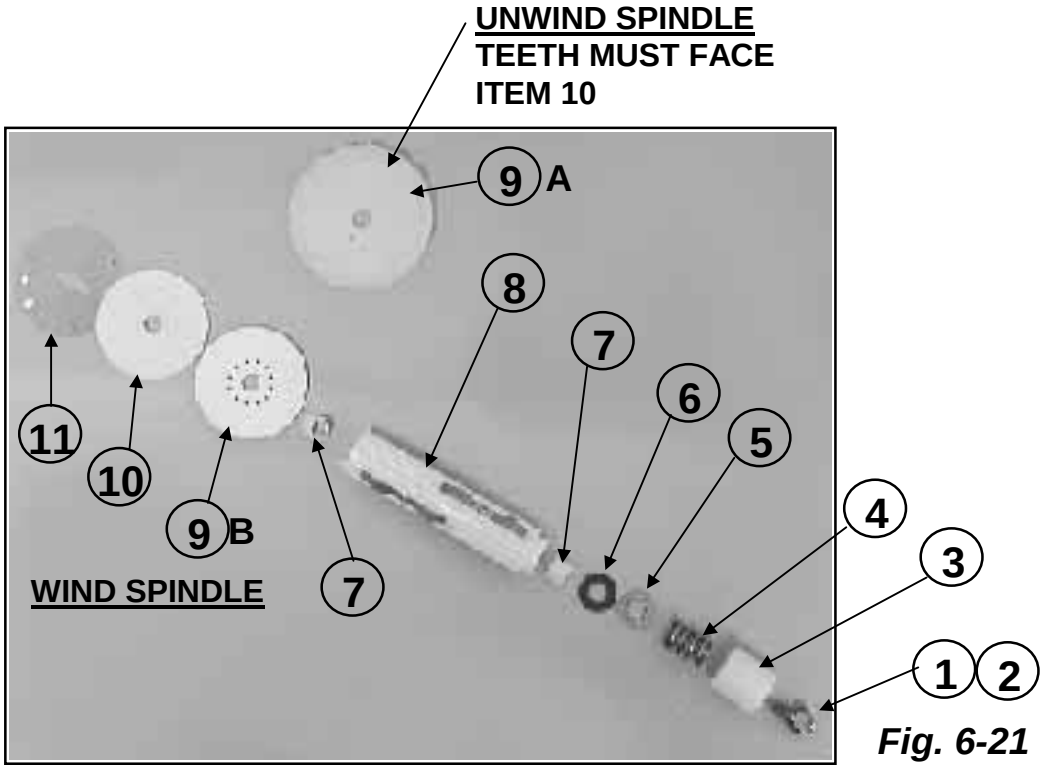


Fig. 6-21

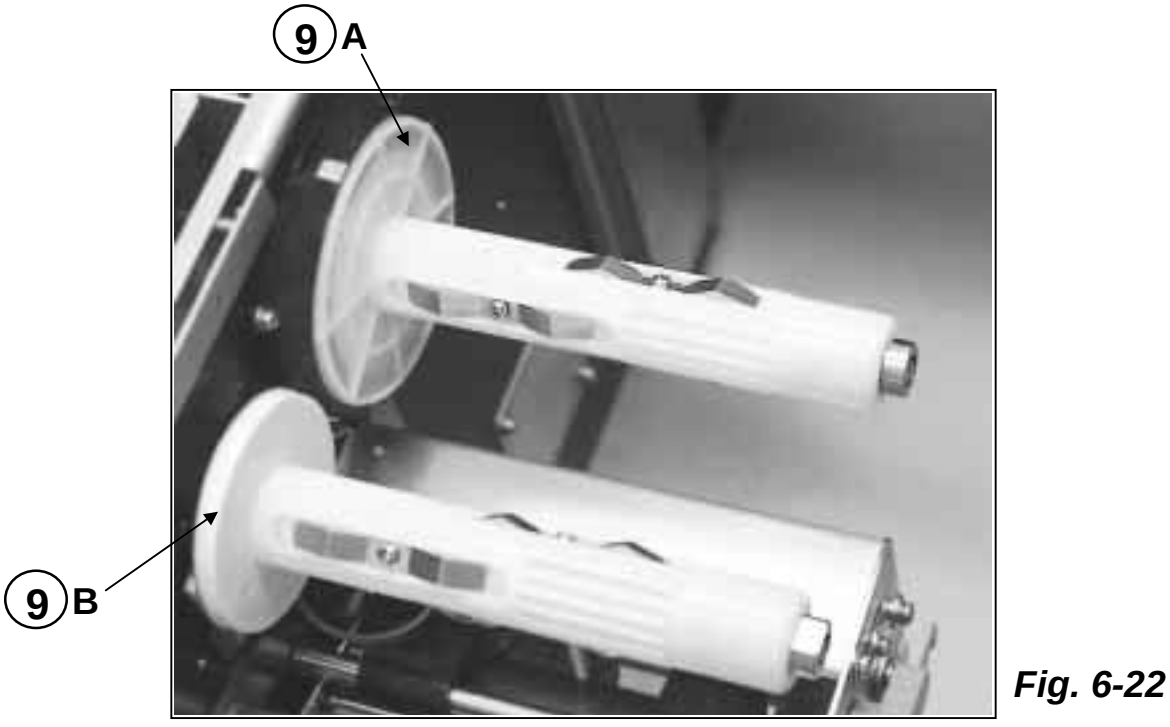


Fig. 6-22

COMPONENTS SHOWN ASSEMBLED

6-9 Replacing the Ribbon Drive Clutch Washers

To replace the parts to each spindle, perform the following steps:
Refer to ***Fig.6-21, 6-22.***

STEP	PROCEDURE
1.	To each spindle install Item 11 Plate with teeth facing outward and align the plate with the peg on the Ribbon Shaft Flange.
2.	Install Item 10 Felt Friction Washer onto the Ribbon Shaft and slide it against Item 11 Plate.
3.	Install (1) ea. Item 9A& 9B Wind and Unwind Disc Plates onto Item 8 Ribbon Bosses. Align the hole in the Disc Plates over the pegs on Item 8. The teeth/slots on the unwind disc plate must be facing away from the Ribbon Boss. Install this assembly onto the Ribbon Shaft and slide it against the felt friction washer.
4.	Install Item 6 Oil-less Dry Metal Washer onto the ribbon shaft with the copper side facing inward (the black carbon side will face outward). Align Item 6 Washer with the peg on #8 Ribbon Boss.
5.	Install Item 5 Disc onto the ribbon shaft with the smooth side facing Item 6 Washer, (one side of the disc is smooth and the other side has sharp edges).
6.	Install Item 4 Spring onto the ribbon shaft.
7.	Install Item 3 Stopper Collar onto the ribbon shaft.
8.	Screw the Item 2 Adjustment Nut clockwise into the end of the ribbon shaft.
9.	Replace #1 Screw and tighten.

NOTE: Do not over-tighten the adjustment nut since this screw is used to adjust the clutch tension. Adjust the clutch tension as outlined in Section 5-2.

6-10 Replacing the Timing Belts

There are three timing belts in the M-8400RV Printer.

Belt "A" - Label Feed Roller Timing Belt is used to feed torque from the stepper motor to a set of toothed pulleys which is connected to the label feed mechanism.

Belt "B" - Platen Pulley Timing Belt is used to transmit torque from the stepper motor to the platen pulley via a set of toothed pulleys.

Belt "C" - Carbon Pulley Rewind Timing Pulley is used to transmit torque from the platen pulley to the ribbon roller via another set of toothed pulleys.

Required Equipment:
- #2 Phillips Screw Driver
- Flat head Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the timing belts. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Remove the ribbon and label stock if installed.
5.	Remove (1) screw holding the label tear off cover. ***Fig. 6-23.***
6.	Remove the center screw holding the carbon rewind shaft to the shaft supporting bracket. Pull rewind shaft forward to dislodge from the bracket and release pressure from belt "C. ***Fig. 6-24.***
7.	Loosen (2) mounting screws attaching the stepper motor to the frame. Access the motor from the opening previously covered by the label cover. Move the motor in the motor mounting slots to release pressure from the belts. Remove and replace belts as required. ***Fig. 6-25.***
8.	Replace center screw to carbon rewind shaft.
9.	Adjust the belt tension as outlined in Section 5-9.
10.	Replace the cover removed in Step 5. Replace and secure the LH cover to the printer base with (2) screws previously removed in Step 3. Tighten (2) inside screws. Reconnect the power.

6-10 Replacing the Timing Belts

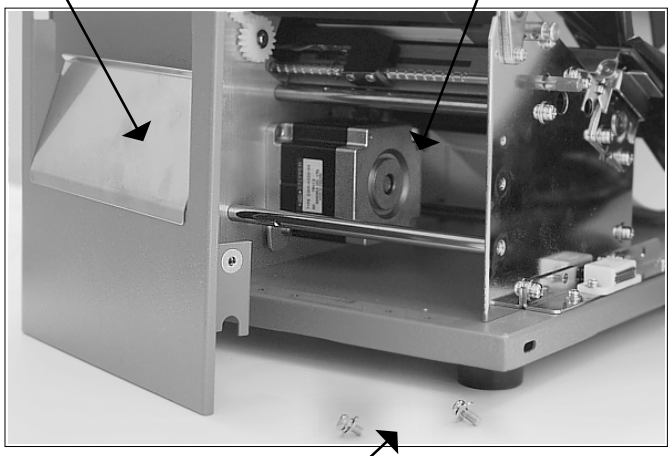


Fig.6-23

Fig. 6-24

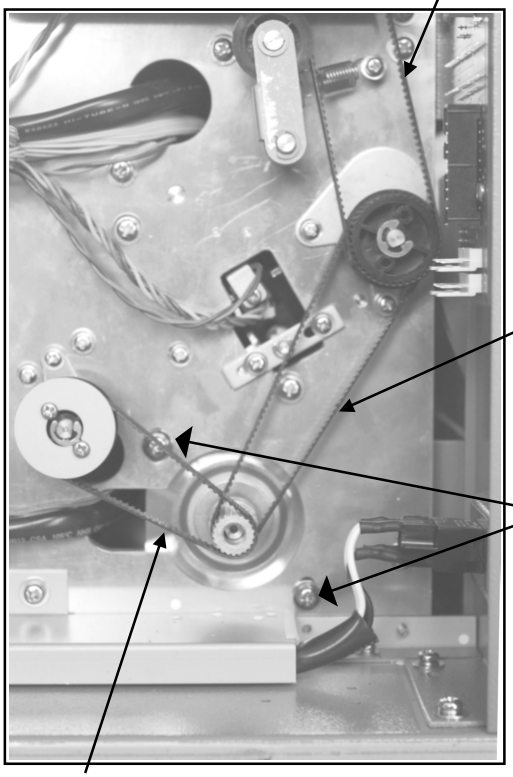


Fig. 6-25

6-11 Replacing the Platen

Before replacing the platen, tension must be released from the timing belts.

Required Equipment:
- #2 Phillips Screw Driver
- Flat head Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (1) screw holding the cover to the frame. Lift off the cover for access to the timing belts. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Remove the ribbon and label stock if installed.
5.	Remove (1) screw holding the label tear off cover. ***Fig. 6-26.***
6.	Loosen the screw holding the clamp which supports the platen to the side frame. ***Fig. 6-27.***
7.	Loosen (2) mounting screws attaching the stepper motor to the frame. Access the motor from the opening previously covered by the label cover. Move the motor in the motor mounting slots to release pressure from the belts. ***Fig. 6-28.***
8.	Remove the E-snap ring from the end of platen shaft and slide off the belts from the toothed gears. ***Fig. 6-29.***
9.	Remove the screw holding the clamp and platen components to the back plate. ***Fig. 6-29.***
10.	Displace platen by tilting up and forward from the hole in the back plate and releasing from ball supporter on opposite end of shaft. Separate the platen and components for replacing. ***Fig. 6-30 & 6-31.***
11.	Install new platen component(s). Refer to Section 5-9 to adjust belts.
12.	Replace the label tear off cover and the LH cover. Reconnect the power.

6-11 Replacing the Platen

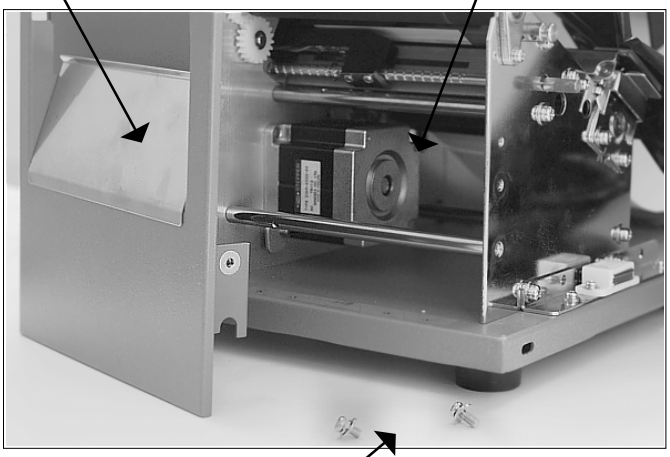


Fig. 6-26

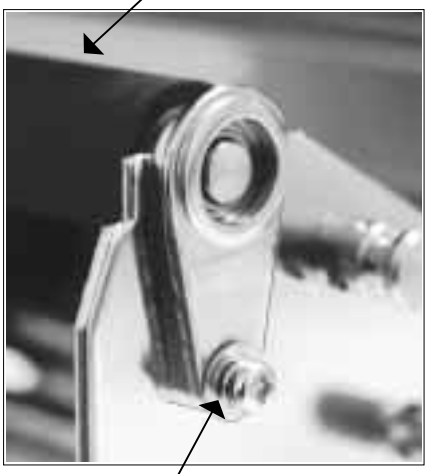


Fig. 6-27

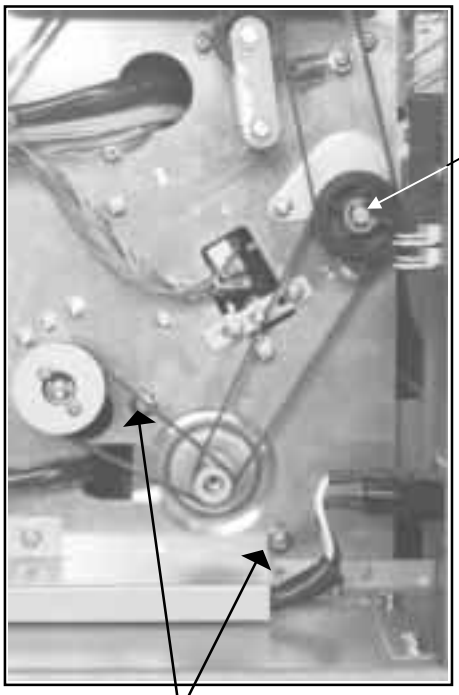


Fig. 6-28

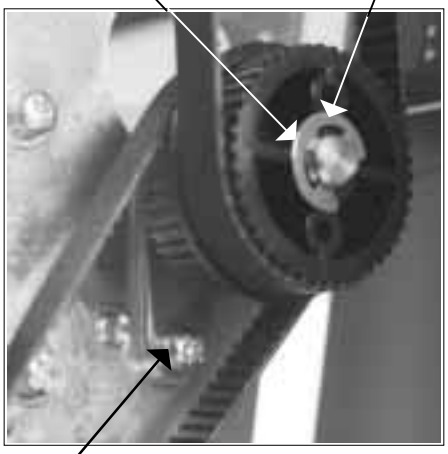


Fig. 6-29

6-11 Replacing the Platen

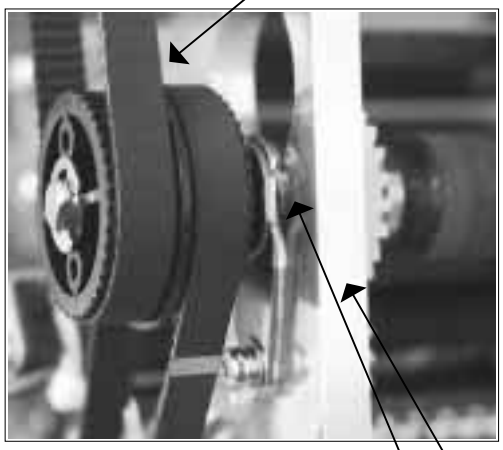


Fig. 6-30

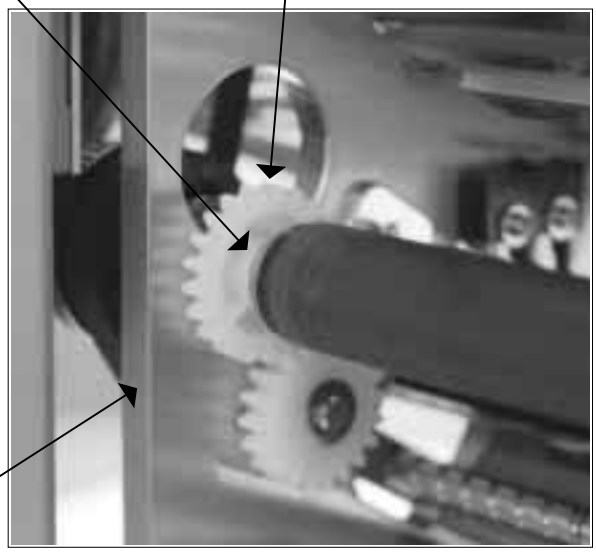


Fig. 6-31

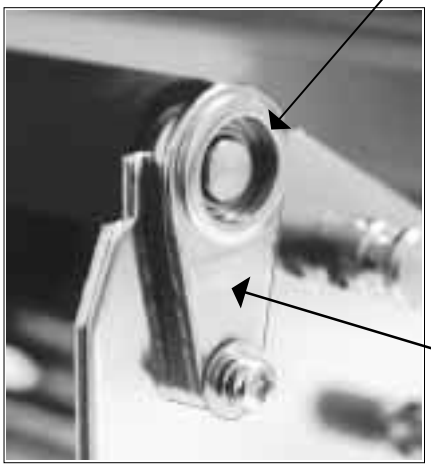


Fig. 6-32

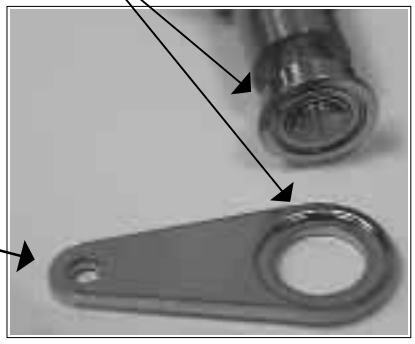


Fig. 6-33

6-12 Replacing the Stepper Motor

The stepper motor is used to transmit motion to the print mechanism for precise print positioning. The stepper motor transmits torque to the label feed roller, the platen roller, the ribbon feed roller, and the ribbon rewind spindle via a series of toothed pulleys and timing belts.

Required Equipment:	#2 Phillips Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the timing belts. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Remove the ribbon and label stock if installed.
5.	Remove (1) screw holding the label tear off cover. ***Fig. 6-34.***
6.	Remove (2) mounting screws attaching the stepper motor to the frame. Access the body of the motor from the opening previously covered by the label cover. Detach the motor from the belts. ***Fig. 6-35.***
7.	Unfasten and remove the pulley from the motor shaft.
8.	Detach (2) screws holding wires to the Label Out Sensor (Micro Switch). Remove and replace the motor. ***Fig. 6-36.***
9.	Reattach the wires to the Label Out Sensor. Remount the motor to the frame and secure the pulley to the motor shaft.
10.	Adjust belt tension as outlined in Section 5-9.
11.	Replace the label tear off cover and replace the LH cover. Reconnect the power.

6-12 Replacing the Stepper Motor

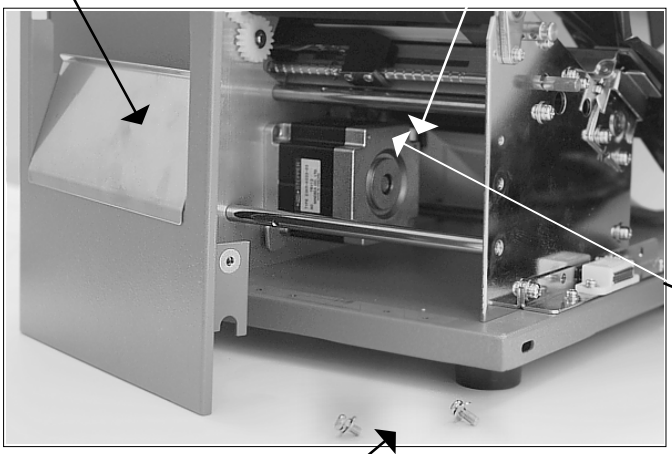


Fig. 6-34

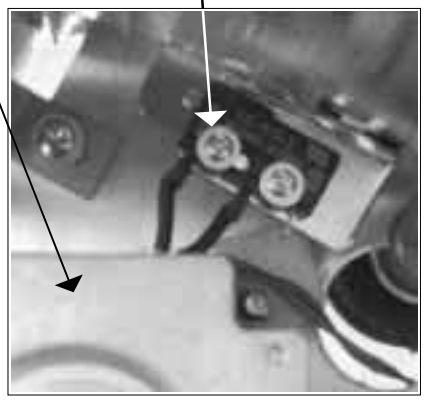


Fig. 6-36

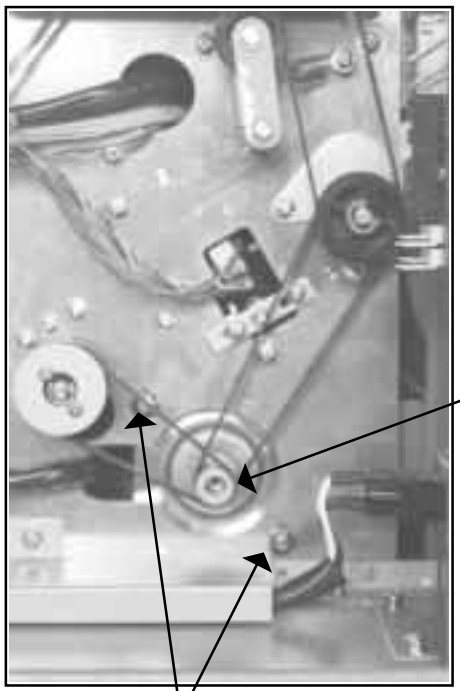


Fig. 6-35

6-13 Replacing the LC Display and Keyboard PCB Display

Access to the display panels is from the left side of the printer.

Required Equipment:	#2 Phillips Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF and disconnect the power cable.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the display PCBs. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Refer to ***Fig. 6-37***. To remove LC Display, remove (2) screws and detach cables. To remove Keyboard PCB Display, remove (2) screws and detach cables. Replace either panel as required.

After replacing either panel, perform the following procedures

1.	Refer to Section 2.1 Dip Switch Settings to readjust.
2.	Refer to Section 4.7 Pitch Offset Adjustment to readjust.
4.	Refer to Section 4.9, 4.10, 4.11 Feed/Backfeed Adjustment to readjust.
5.	Refer to Section 2.3 Printer Adjustment to adjust print darkness.

6-13 Replacing the LC Display and Keyboard PCB Display

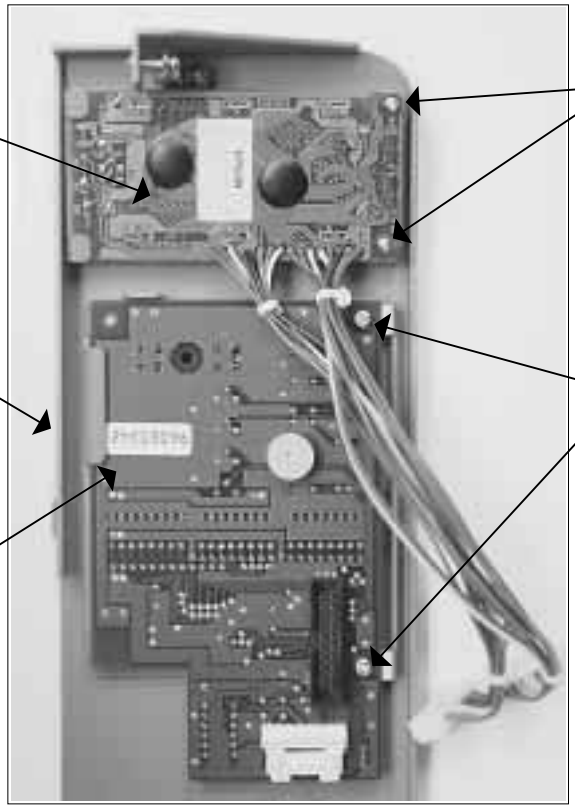

LC DISPLAY PANEL
FRONT LEFT SIDE COVER SHOWN DETACHED FROM PRINTER
KEYBOARD PCB DISPLAY PANEL
(2) MOUNTING SCREWS
(2) MOUNTING SCREWS

Fig. 6-37

Section

7

Factory Resets

7-1 Overview

The Factory Reset Mode allows you to:

- Reset the printer
- EEProm Clear all
- Clear Counter Heads
- Clear Cutter Counter

7-2 Resetting the Printer (Test Print)

This procedure allows the user to run a self test to verify:

- Head Counters
- Print Quality
- Printer Setups

Refer to Page 118 for test print sample.

To run the test perform the following steps:

STEP	PROCEDURE
1.	Record all current dip switch positions, then place all switches in the off position.
2.	Place the DSW2-5 in the ON position.
3.	Place the print head in the OPEN position, keeping both the **LINE & FEED** keys depressed power on the printer.
4.	Upon hearing the audible tone, release the **LINE & FEED** keys. Place the print head back in the CLOSED position and DSW2-5 in the OFF position.
5.	Verify display: "Factory Mode".
6.	Press the **FEED** key once. Verify display:
7.	Press the **LINE** key to initialize reset. After a slight pause, (1) blank will feed out followed by a factory test print. ***Warning:*** *This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.*
8.	Press the **FEED** key to stop printing.
9.	Place the printers power switch to the off position, and return all switches to their original positions.

7-3 EEProm Clear All

This setting clears all counters, and resets printer to factory defaults.

STEP	PROCEDURE
1.	Record all current dip switch positions, then place all switches in the OFF position.
2.	Place the print head in the open position. Turn on DSW1-7 & 8 and DSW2-5.
3.	Turn on the power while pressing the **LINE & FEED** keys. Release when an audible sound is heard. Verify display. "Head Open".
4.	Place the print head back in the closed position. Turn off DSW1-7 & 8 and DSW2-5 (in that order). Verify display: "Factory Mode".
5.	Press the **FEED** key once. Verify display: COUNTER CLEAR NON.
6a.	Press the **LINE** key once to change the display from **NON** to **ALL**. Verify display:
6b.	Press the **FEED** key. Version1E2040 display reads: "FACTORY TEST PRINT" and printer starts printing test prints. Press Feed key to pause.
7.	Press the **LINE** key to initialize reset. After a slight pause, (2) blank labels will feed out followed by a test print.
8.	Press the **FEED** key to stop printing. Verify that the counters on test print have reset to 0.0 km.
9.	Place the power switch to the OFF position, and return all switches to the original positions.

```
COUNTER CLEAR
ALL
```

Warning: *This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.*

IMPORTANT NOTE: To clear EEPROM ERROR this procedure may need to be performed twice.

Refer to Page 118 for test print sample.

7-4 Clear Counter Heads

STEP	PROCEDURE
1.	Record all current dip switch positions, then place all switches in the off position.
2.	Place the print head in the open position and the DSW2-5 in the ON position.
3.	Turn on the power while pressing the **LINE & FEED** keys. Release when an audible sound is heard.
4.	Place the print head back in the closed position and DSW2-5 in the OFF position. Verify display: "Factory Mode".
5.	Press the **FEED** key once. Verify display:
6a.	Press the **LINE** key twice to change the display to HEAD.
6b.	Press the **FEED** key. The head counter will be reset to "0" zero.
7.	Press the **LINE** key once. After a slight pause, (1) blank label will feed out followed by a test print.
8.	Place the printers power switch to the OFF position, and return all switches to their original positions.

Warning: *This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.*

Refer to Page 118 for test print sample.

7-5 Clear Cutter Counter

STEP	PROCEDURE
1.	Record all current dip switch positions, then place all switches in the off position.
2.	Place the print head in the open position and the DSW2-5 in the ON position.
3.	Turn on the power while pressing the **LINE & FEED** keys. Release when an audible tone is heard.
4.	Place the print head back in the closed position and DSW2-5 in the off position. Verify display: "Factory Mode".
5.	Press the **FEED** key once. Verify display:
6a.	Press the **LINE** key three times to change the display to CUT.
6b.	Press the FEED key. The cut counter will be reset to "0" zero.
7.	Press the **LINE** key once. After a slight pause, (1) blank label will feed out followed by a factory test print.
8.	Verify that cutter counter has been reset to (0).
9.	Place the printers power switch to the off position, and return all switches to their original positions.

Warning: *This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.*

Refer to Page 118 for test print sample.

Factory/Service Mode
156
Life Counter 0.0 Km
Head Counter 1 0.0 Km
Head Counter 2 0.0 Km
Head Counter 3 0.0 Km
Cutter Counter 0
158
H : Horizontal Offset +000 DOT
V : Vertical Offset 000 DOT
Print Speed 150 mm/s
Print Darkness 3
ROM 1 Version 1E2048
ROM 2 Version 2E2000
DATE 980611_1
Head Check [All Check] OK
Reflective Sensor Low VR1 [0.1 ~ 0.8] NONE
Reflective Sensor High VR1 [1.5 < Hi-Lo] NONE
Reflective Sensor Slice Level 1.3v
Transmissive Sensor Low VR2 [0.1 ~ 0.8] 0.7v
Transmissive Sensor High VR2 [1.5 < Hi-Lo] 3.9v
Transmissive Sensor Slice Level 1.7v
Factory Pitch Offset VR5 [-1.5 ~ +1.5] +1.25mm
Print VR1 Front [30 ~ 60] 78
Offset VR2 Front [-1.5 ~ +1.5] +0.00mm
Pitch VR3 Front [-1.5 ~ +1.5] +0.00mm
DSW1
DSW2
DSW3

Test Print Sample

Section

8

Troubleshooting

8-1 Overview

The design of the SATO M-8400RV printer is based upon proven technology and reliable components. When a problem occurs, the solution can be easily traced using the troubleshooting tables in this section. This table list symptoms, probable causes, and suggested corrective actions. Many of the suggested corrective actions include references to a section or paragraph found elsewhere in this manual, where more complete descriptions and procedures may be found.

Both print quality and general operational problems are listed in the troubleshooting table.

Make sure the basics have been checked before deciding you are unable to proceed any further. To help you this section has been divided into the following parts:

- *Initial Checklist*
- *Centronics Parallel Interface*
- *RS232C Serial Interface*
- *Error Signals*
- *Troubleshooting Tables*
- *Head Pattern Examples*

8-2 Initial Checklist

If you are unable to produce output on the M-8400RV, check the following before deciding you are unable to proceed any further.

1. Is the printer powered up and ON-LINE?

2. Do any of the Front Panel LEDs indicate an error condition? If this light is ON, it may indicate the print head assembly is open.

3. Is the Print Head and the Label Hold Down in the down and latched position?

   Other areas that may need looking at include:

8-3 Troubleshooting the Centronics (Parallel) Interface

1. Is the IBM parallel printer cable connected securely to your parallel port (DB-25S Female) on the PC and to the Centronics connector on the printer?

   Warning: Never connect or disconnect interface cables (or use a switch box) with power applied to either the printer or the host. This may cause damage to the interface circuitry and is not covered by warranty.

2. Is there more than one parallel interface port on your PC (LPT1, LPT2, etc.)? If so, make sure you are sending data out the correct port.

3. When you send the print job to the printer, and it does not respond, do you get an error message on your PC that says “Device Fault” or something similar?

   This may mean that the computer doesn’t know the printer is there. Verify that:

   a. Both ends of the cable are securely inserted into their respective connectors.

   b. The printer is ON-LINE.

   c. The cable is not defective. There are other things that can cause this error message on your computer, but at this stage, a defective cable may be one of the reasons.

4. When you send the print job to the printer and it does not respond, and there is no error message on the PC:

   a. Check your data stream for some of the basics. Is your job framed as follows?

   <ESC>A—DATA---<ESC>Z

   b. Verify that you've included all required parameters in the data stream.

   c. Verify the following:

   - You have not typed a "0" (zero) for an "O" (letter) or vice-versa.
   - You have not missed any **<ESC>** characters where they're needed.
   - Make sure all printer command codes are capital letters.
   - Your protocol codes are set for Standard or Non-Standard and your data stream is consistent with these.

5. If you've checked all of the above and the printer still isn't printing, you may want to try a Receive Buffer Hex Dump to determine what (if anything) the printer is receiving from your computer. See Hex Dump Diagnostic Labels.

   The Centronics port is now listening for incoming data. Send your print job. The printer will now print (only once) a Hexadecimal (Hex) Dump of everything it received from the host computer. Each 2-digit hexadecimal character represents a character the printer received. It may be tedious, but now you can analyze and troubleshoot the data stream.

6. While checking the Hex Dump printout, if you notice 0D 0A (Carriage Return and Line Feed) characters throughout. The command string should be continuous. CR or LF characters are not allowed between the Start Command (<ESC>A) and the Stop Command (<ESC>Z). If you are using BASIC, it may be adding these characters automatically as the line wraps. Adding a "width" statement to your program can help to suppress these extra 0D 0A characters by expanding the line length up to 255 characters.

   If you're not programming in BASIC, check to see if you have an equivalent statement in the language you're using to suppress extra carriage returns and line feeds from your data being sent out to the printer. We want the data stream to be one complete line going to the printer.

8-4 Troubleshooting the RS232C (Serial) Interface

1. Is the RS232C Serial cable connected securely to your serial port on the PC (DB-25S Male) and to the RS232C connector on the printer?

   Warning: Never connect or disconnect interface cables (or use a switch box) with power applied to either the printer or the host. This may cause damage to the interface circuitry and is not covered by warranty.

2. Is the cable defective? At the very least, you should be using a "Null Modem Cable," which crosses pins in a specific manner. This should enable your printer to print. We recommend that you use a cable built to specifications described in Section 3, Interface Specifications.

3. Check for obvious errors in the data stream. Remember that all print jobs for serial data must be framed by an STX and ETX.

4. If after sending your job to the printer, it only "beeps" (or displays a Framing Error message on the LCD panel), you may have a configuration problem. There may be some inconsistencies with the Baud Rate, Parity, Data Bits, or Stop Bits in relation to your host computer. If you are confused as to what the printer's current RS232 settings are, you may choose the SATO defaults (all DIP switches in the OFF position) to achieve 9600 baud, no parity, 8 databits, and 1 stop bit.

5. If you still are unable to get printer output, try the Hex Dump as described in Step 5 under the Centronics Interface troubleshooting. In this case, the printer monitors its RS232C interface for incoming data.

6. From the Hex Dump, if you are seeing extra 0D 0A (CR and LF) characters, and are using BASIC, refer to the beginning of the Command Code section in the Operator and Technical Reference Manual.

8-5 Error Signals

LED	LCD MESSAGE	AUDIBLE BEEP	ERROR CONDITION	TO CLEAR
Error On	Machine Error	1 Long	Machine Error	Cycle power ON/OFF
Error On	EEPROM Error	1 Long	EEPROM Read/Write	Cycle power ON/OFF
Error On	Head Error	1 Long	Head	Cycle power ON/OFF
Error On	Sensor Error	3 Short	Sensor	Cycle power ON/OFF
Error Blinks	Card R/W Error	1 Long	Memory Card Read/Write	Cycle power ON/OFF
Error Blinks	Card Low Battery	1 Long	Memory Card Battery Low	Cycle power ON/OFF
Error Blinks	Head Open	3 Short	Head Open	Close head lever
Error Blinks	Cutter Error	3 Short	Cutter	Cycle power ON/OFF
Error On Line Blinks	PARITY ERROR	3 Short	RS232 Parity Error	Cycle power ON/OFF
Error On Line Blinks	Overrun Error	3 Short	RS232 Overrun Error	Cycle power ON/OFF
Error On Line Blinks	Framing Error	3 Short	RS232 Framing Error	Cycle power ON/OFF
Error On Line Blinks	Buffer Over	3 Short	Buffer Overflow	Cycle power ON/OFF
Error Blinks Label On	Paper End	3 Short	Label End	Open/close Head Lever Open/close Label Hold down
Error Blinks Ribbon On	Ribbon End	3 Short	Ribbon End	Open/close Head Lever Open/close Label Hold down
Error Blinks Label Blinks	Media Error	3 Short	Media Error	Open/Close Head Lever
Ribbon Blinks		None	Ribbon Near End	Replace ribbon with full roll
Line Blinks		None	Buffer Near Full	Slow down transmission rate

8-6 Troubleshooting Tables

The troubleshooting tables below include the following general symptom descriptions:

- Image Voids
- Ribbon Wrinkle
- Light Images
- Smearing
- No Ribbon Movement
- No Label Movement
- No printed Image
- Display Problem
- POWER LED not on
- ERROR LED on
- LABEL LED on
- RIBBON LED on
- ON LINE LED not on
- No Label Drive

Print Quality Problems

Symptom	Probable Cause	Suggested Corrective Action
ON LINE LED not on	LABEL, RIBBON, ERROR LED (s) on	Clear error condition
	Illegal printer memory state	Cycle POWER switch off and back on
No Label Drive	Timing Belt bad/loose	Replace/tighten timing belts (6-10)
Image Voids	Poor quality labels	Use thermal transfer compatible stock
	Poor quality ribbons	Use genuine SATO ribbons
	Ribbon not matched to label stock	Check with media suppliers
	Damaged electronics	Replace circuit board (6-4)
	Damaged Platen	Replace Platen

Print Quality Problems

Symptom	Probable Cause	Suggested Corrective Action
Ribbon Wrinkle	Poor Head Alignment/ Head Balance	Adjust head balance (5-5) Adjust ribbon roller Adjust head alignment
	Poor Ribbon Tension	Adjust ribbon tension
	Worn Platen	Replace platen (6-11)
	Foreign material on head or platen	Clean head and platen
Light Images	Poor quality labels	Use thermal transfer compatible stock
	Poor quality ribbons	Use genuine SATO ribbons
	Low print head energy/darkness	Adjust darkness control (See Operator Manual)
	Head balance uneven	Correct head balance
	Ribbon not matched to label stock	Use Premier II ribbon with a “1C’ thermal transfer ribbon stock or equivalent for optimum results
	Low ribbon drive torque No ribbon movement	Adjust ribbon drive clutch (5-2)
	Foreign material on head	Clean head and platen
	Poor head alignment	Align Print Head (5-4)
	Excessive print speed	Reduce print speed setting

Symptom	Probable Cause	Suggested Corrective Action
Smearing	Poor quality labels	Use Premier II ribbon with a "1C" thermal transfer ribbon stock or equivalent for optimum results
	Poor quality ribbons	Use genuine SATO ribbons
	Foreign material on head/platen	Clean head and platen
	Foreign material on labels	Use high quality label stock
	Excessive print head energy	Adjust darkness control
	Excessive print speed	Adjust print speed
	Excessive head pressure	Use correct head balance
No Ribbon Movement	Incorrect ribbon core size	Use genuine SATO ribbons
	Loose drive clutch	Adjust clutch tension (5-2)
	Loose platen drive belt	Adjust/replace belt (6-10)
	No + 24 volt output	Test power supply and replace if required (4.3, 6.5)
	Loose service screws on rewind pulley	Tighten service screws
	Damaged electronics	Replace circuit board (6.4)
No Label Movement	Loose/broken platen drive belt	Adjust/replace belt (6.10)
	Incorrect label pitch sensor selected	Select correct label sensor type (DSW2-2)
	No +24 volt output	Replace fuse on main PCB (6.2) Test power supply and replace if required (4-3)
	Loose set screw on platen pulley/stepper motor	Tighten set screws
No Printed Image	Print head not connected	Verify print head connector fully seated at head and main PCB (6-3)
	Ribbon upside down	Use genuine SATO ribbons
	No + 24 volt output	Test power supply and replace if required (4-3)

Symptom	Probable Cause	Suggested Corrective Action
No Printed Image	Damaged print head	Replace print head (6-3)
	Damaged electronics	Replace circuit board (6-4)
Back light but no words on display or no display.	Most common failure of printer is DOA situation. The most likely cause is the ribbon cable has fallen out or not seated fully into connector. Adjust display potentiometer on display panel	Verify that the cable and connector are properly seated.
POWER LED not on	AC power cable not connected	Verify that the cable is connected to the printer and the AC outlet
	Main Power Fuse defective	Replace fuse (6-2)
	Defective power supply	Test power supply and replace if defective (4-3, 6-5)
ERROR LED on	Head not locked	Close and latch head release
LABEL LED on	Label supply roll empty	Replenish label supply
	Label stock not routed through sensor	Reload labels
	Label sensor not positioned correctly	Adjust sensor position
	Label sensor blocked	Clean label sensor
	Incorrect label sense threshold setting	Adjust label sense threshold (4-3, 4-4)
	Platen drive malfunction	See Section 5, Mechanical Adjustments
RIBBON LED on	Ribbon supply roll empty	Replenish ribbon supply
	Ribbon sensor out of alignment	Realign ribbon sensor (4-6)
	Ribbon sensor blocked	Clean ribbon sensor
	No cardboard core on ribbon rewind	Use cardboard core on ribbon rewind

8-7 Head Pattern Examples

Fig. 8-1

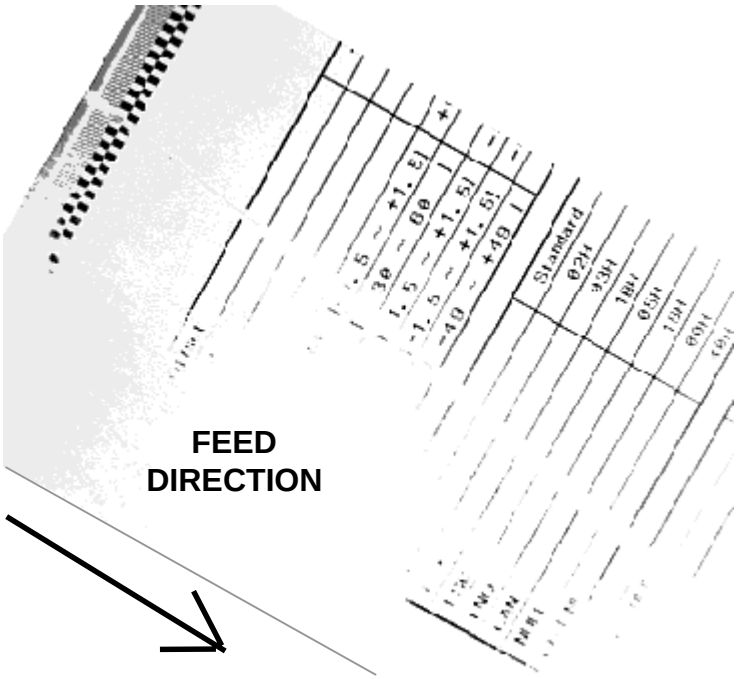
FACTORY DEFAULT

FEED DIRECTION

Fig. 8-2

GOOD ADJUSTMENT, CLEAR, DARK, EVEN TEXT

8-7 Head Pattern Examples



DISPLAY:
IRREGULAR UNEVEN TEXT, ECCENTRIC NUT TURNED TOO FAR COUNTER CLOCKWISE

CAUSE:
POOR HEAD ALIGNMENT, BALANCE OUT OF ADJUSTMENT

Fig. 8-3

DISPLAY:
IRREGULAR UNEVEN TEXT, ECCENTRIC NUT TURNED TOO FAR CLOCKWISE

CAUSE:
POOR HEAD ALIGNMENT, BALANCE OUT OF ADJUSTMENT

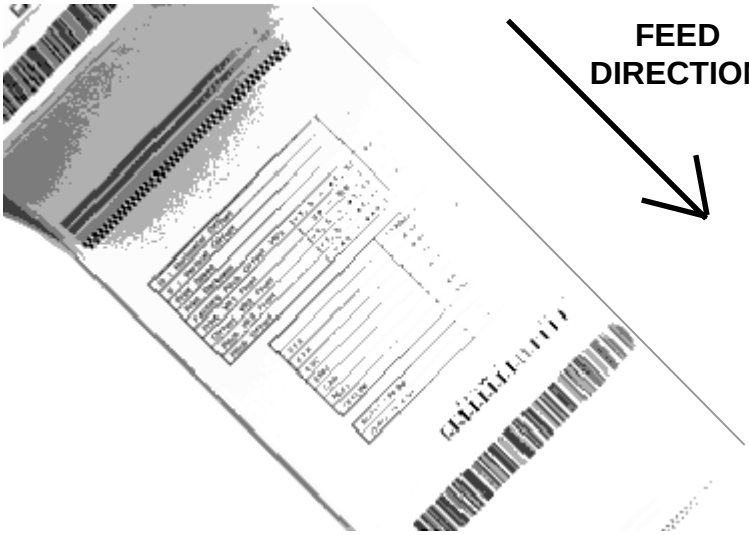


Fig. 8-5

8-7 Head Pattern Examples

Fig. 8-6

DISPLAY:
RIBBON WRINKLE, DIAGONAL VOIDS (WHITE STREAKS) THAT "WALK" ACROSS LABEL

CAUSE:
POOR HEAD ALIGNMENT,
POOR RIBBON TENSION,
WORN PLATEN,
FOREIGN MATERIAL,
DAMAGED PRINT HEAD

Section

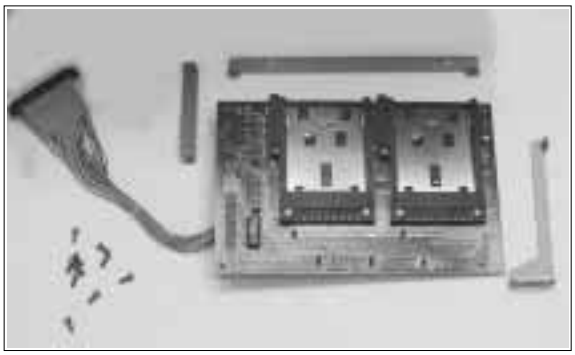
9

Options

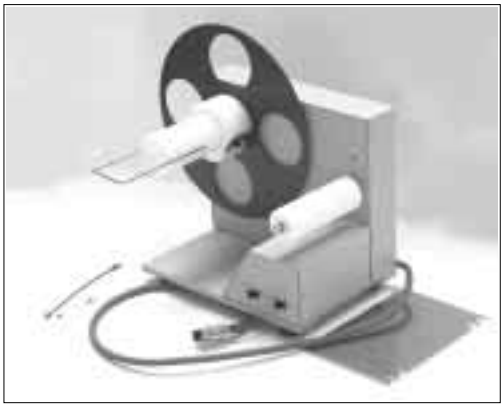
9-1 Overview

The following options are available for the M-8400RV printer.

- ***Memory Card***
- ***Label Dispenser***
- ***Label Rewinder***
- ***Label Cutter***
- ***Calendar***



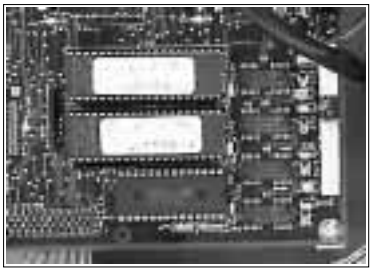
Memory Card



Label Rewinder

Label Dispenser

Label Cutter



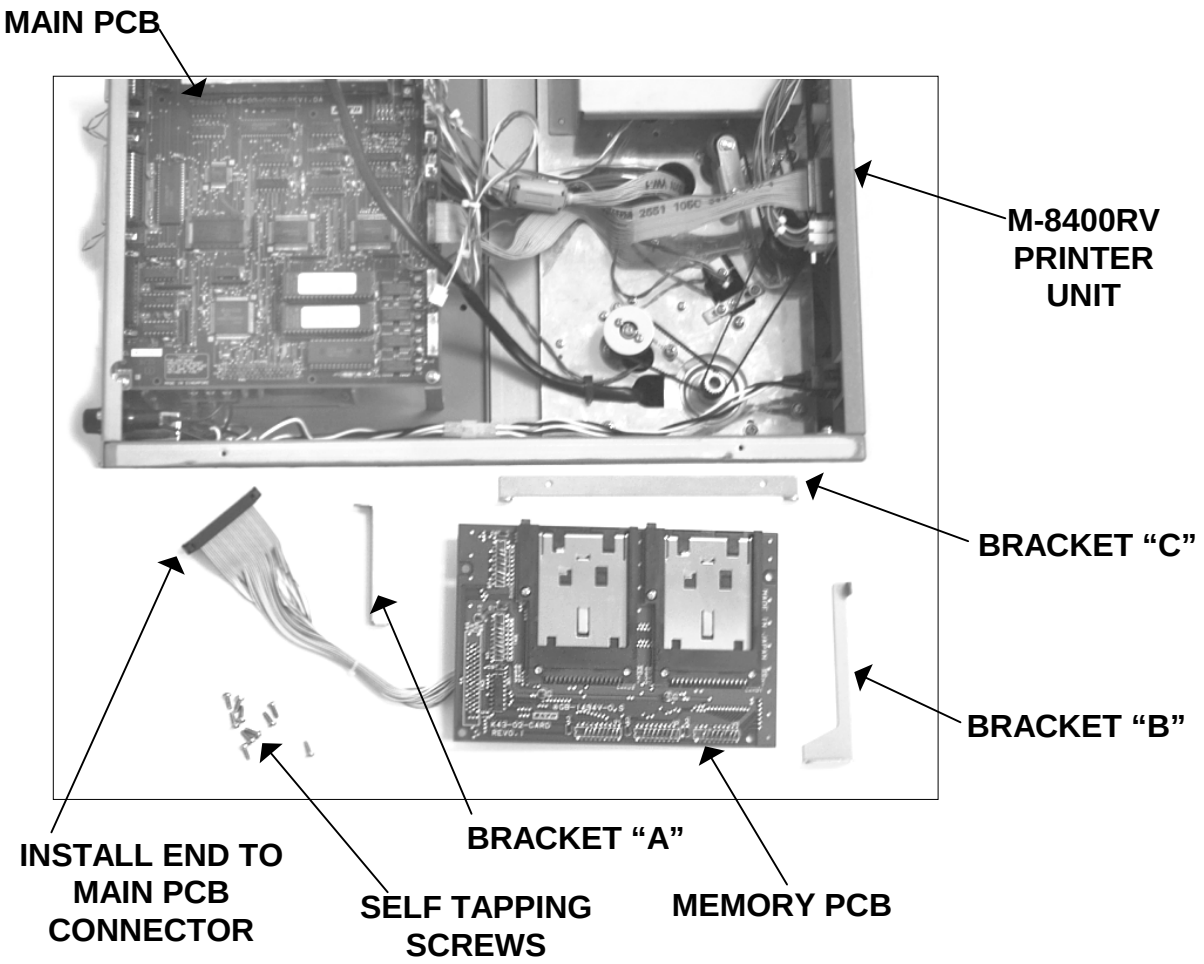
Calendar

9-2 Memory Card

Description:

The Memory Card Option provides the connectors and interface board for two PCMCIA memory card slots. The two Memory Card slots, labeled Card 1 and Card 2, are on the memory option board mounted inside the printer. Access to these cards is by removing the PC board compartment cover. The printer memory can be expanded up to 4MB.

Type	SRAM
Applicable Specifications	PCMCIA Version 2.1 (JEIDA Version 4.1)
Size	128KB, 256KB, 512KM, 1MB or 2MB
Connector Pins	68
Battery	Approximately two years (manufacturer dependent)
Write Protect	Yes
Low Battery Detect	Yes



9-2 Memory Card

Installation

Required Equipment: #2 Phillips Screwdriver

NOTE: Many of the components on these boards are extremely susceptible to damage by static electricity. To avoid damage from static electricity, do not unpack new circuit boards from anti-static bags until instructed to do so.

STEP	PROCEDURE
1.	Switch the printer OFF but keep the power cable plugged in to discharge any possible static charges.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the electrical section. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Refer to ***Fig. 9-1*** and install the brackets. a) Insert (1) self tapping screw through clearance hole in printer back panel and thread into Bracket "A". b) Insert (2) self tapping screws through clearance holes in Bracket "B" and thread into printer base. c) Insert (2) self tapping screws through clearance holes in Bracket "C" and thread into printer base. Tighten all screws firmly.
5.	Fasten memory PCB to brackets with (4) screws. Refer to ***Fig.9-2***.
6.	Route the cable from the memory card and attach to the connector which is located on the back side of the main PCB. Note proper key alignment. Refer to ***Fig. 9-3***.
7.	Install memory module(s). Refer to ***Fig. 9-4.***
8.	Upon completion of memory installation, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws and reconnect the power.

9-2 Memory Card

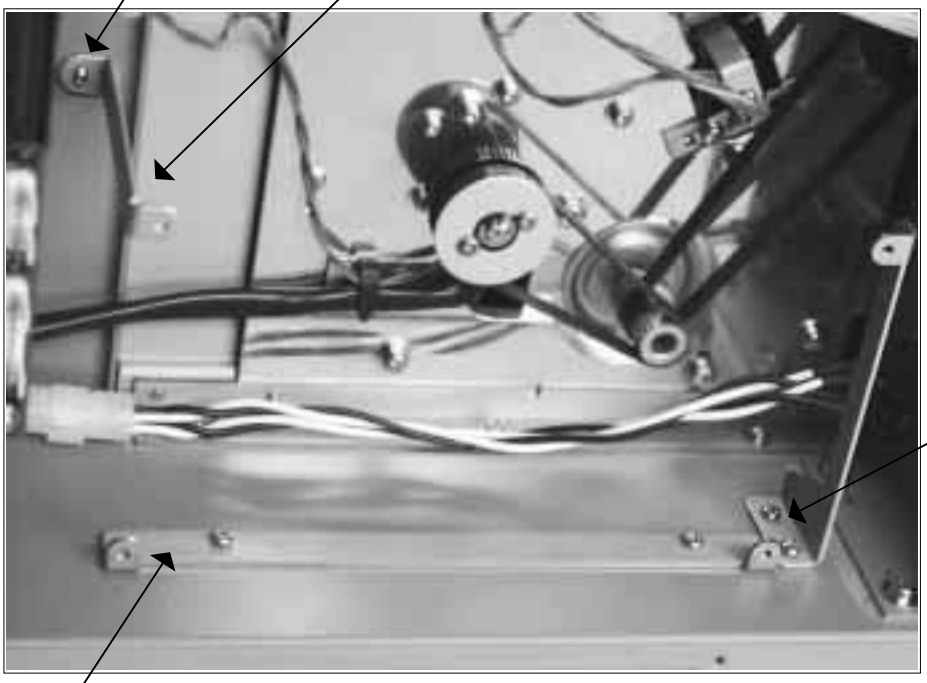


Fig. 9-1

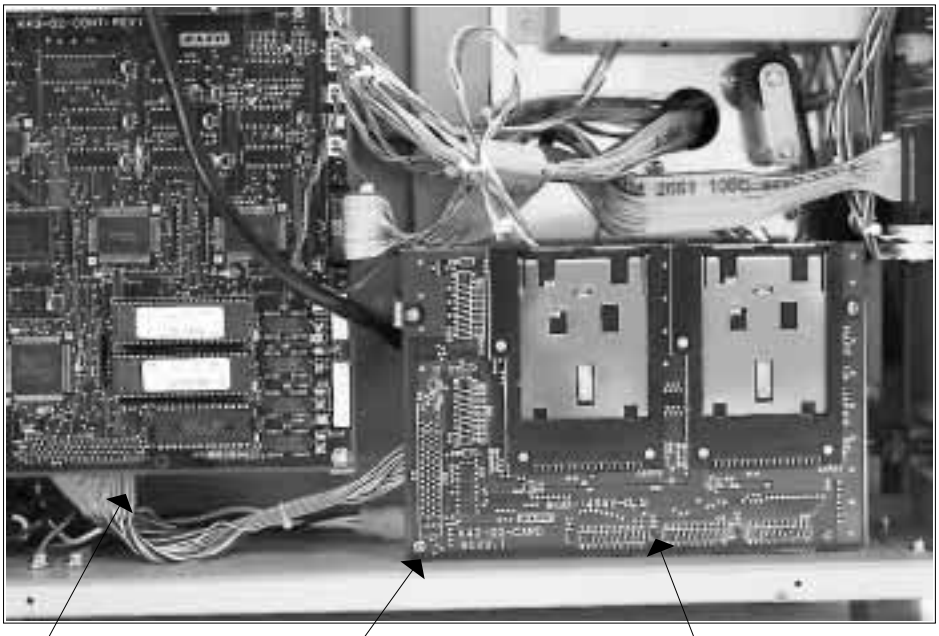
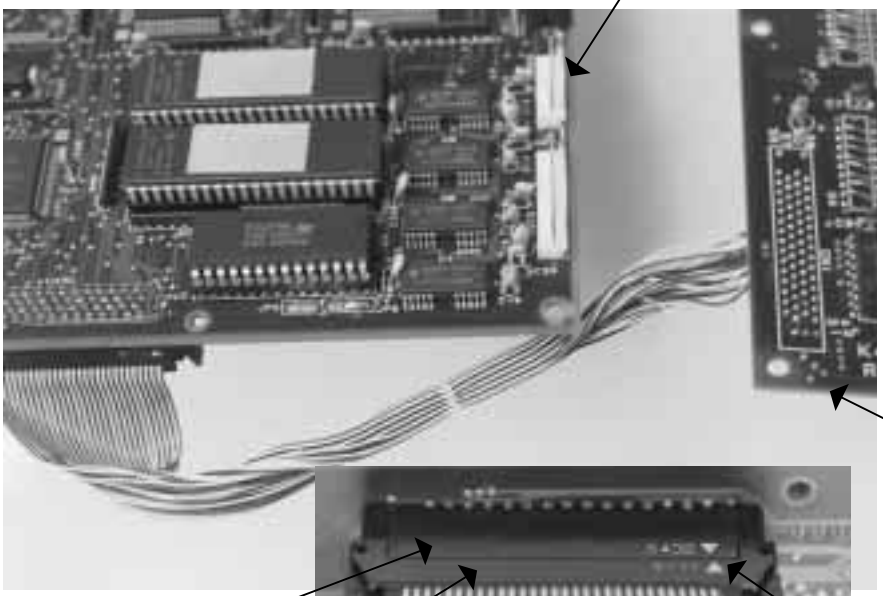


Fig. 9-2

9-2 Memory Card



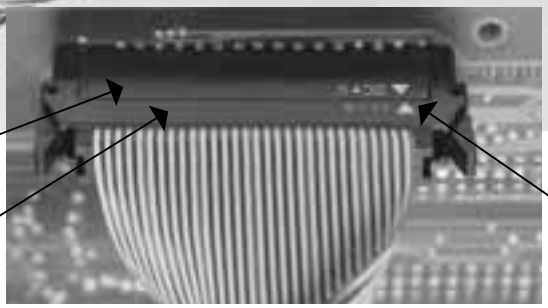


Fig. 9-3

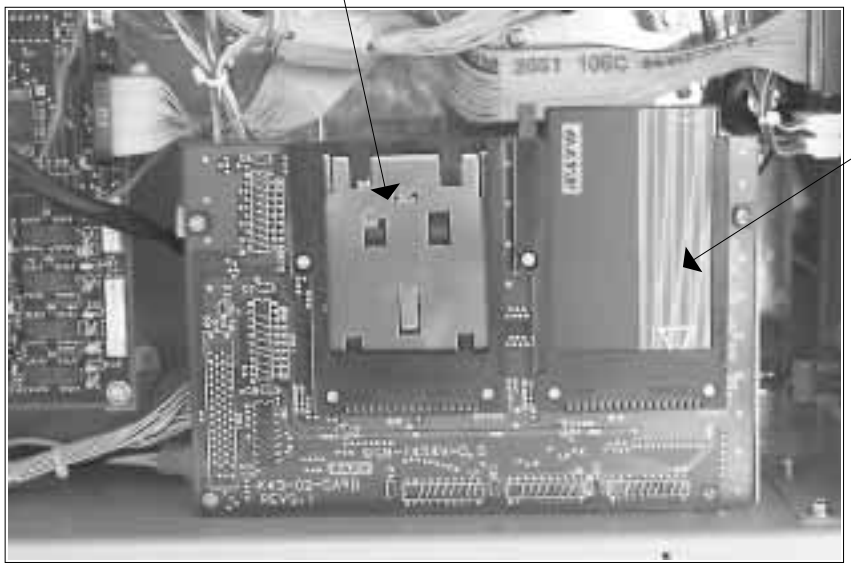


Fig. 9-4

9-2 Memory Card

Error Handling:

ERROR DESCRIPTION	INDICATION	REMEDY
Low Battery - Low battery condition is detected when printer is powered on.	ERROR LED: Blinking Audible Beep: 1 long Display: Card Low Battery Depress LINE key to print Card Status	Replace Memory Card battery. Note that all data will be lost when the battery is removed.
Card R/W Error 1. No card is inserted. 2. Card is write protected. 3. Invalid store/recall number. 4. Card has not been initialized.	ERROR LED: On Audible Beep: 1 long Display: Card R/W Error Printer must be powered off to reset.	1. Insert card into selected slot. 2. Remove write protect tab. 3. Correct program. 4. Initialize card with BJF command.
Warning 1. Duplicate number. 2. Data not in print area. 3. Data overflows card memory.	Audible Beep: 1short Display: None Printer will ignore invalid commands.	1. Correct program. 2. Correct program. 3. Correct program.

9-3 Label Dispenser Unit

Installation of the optional M-8403 Label Dispenser into the printer adds the convenience of automatic label dispensing. Each label is printed, then peeled from the backing paper and presented at the front of the printer for removal by the operator. A photo-electric sensor detects the presence of a completed label and signals the printer to await removal. Once the completed label is removed this sensor signals the printer to automatically backfeed the label stock for correct alignment of the printing on the next label.

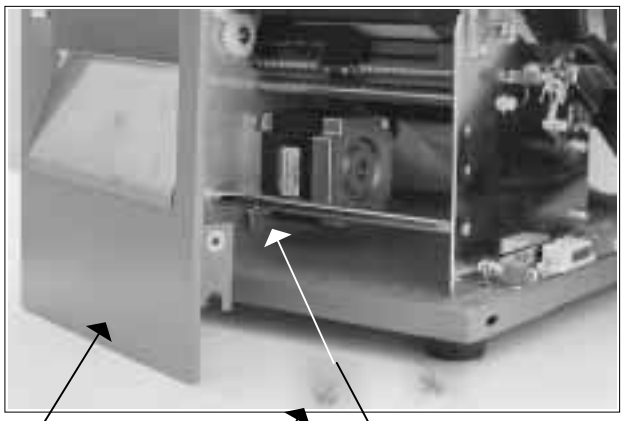
Installation:

Required Equipment:	#2 Phillips Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF but keep the power cable plugged in to discharge any possible static charges.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the sensor module. ***Refer to Fig. 4-1, 4-2 & 4-3 in Section 4.***
4.	Remove (2) screws holding the label cover to the printer. Rotate the cover down, then remove it by lifting up. Refer to ***Fig. 9-5.***
5.	Move the print head lock lever to the open position. Refer to ***Fig. 9-6.***
6.	Insert the Dispenser in place of the cover removed in Step 4, carefully mating the Dispenser's drive gears with those of the print mechanism while routing the cable through the slot in the printer side wall. Refer to ***Fig. 9-7.*** NOTE: Remove and dispose of extra screw from the side of the Dispenser side wall.
7.	Replace the (2) screws removed in Step 4.
8.	Mate the cable from the Dispenser to the socket on the free end of the 3-wire cable, carefully observing the keying of the connectors. ***Refer to Fig. 9-8.***
9.	Carefully route all cables and close the door and lid and secure cover with screws removed in Step 3.
10.	Connect the AC power cord to the printer and place the power switch in the ON position. The installation of the Dispenser is now complete.

9-3 Label Dispenser Unit

Installation:



LABEL COVER

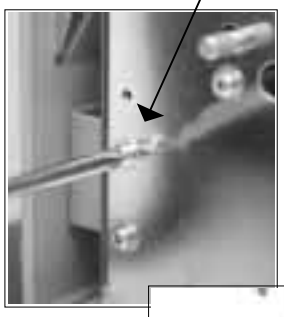
(2) SCREWS

MOTOR MOUNTING SCREWS,

Fig. 9-5

LOCK LEVER SHOWN IN OPEN POSITION

Fig. 9-6



MATE DISPENSER GEARS TO PRINTER GEARS

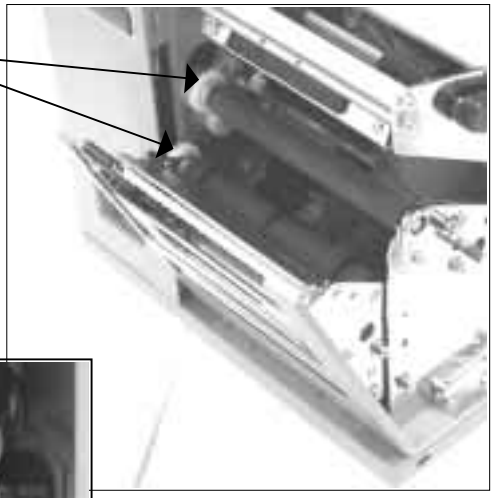
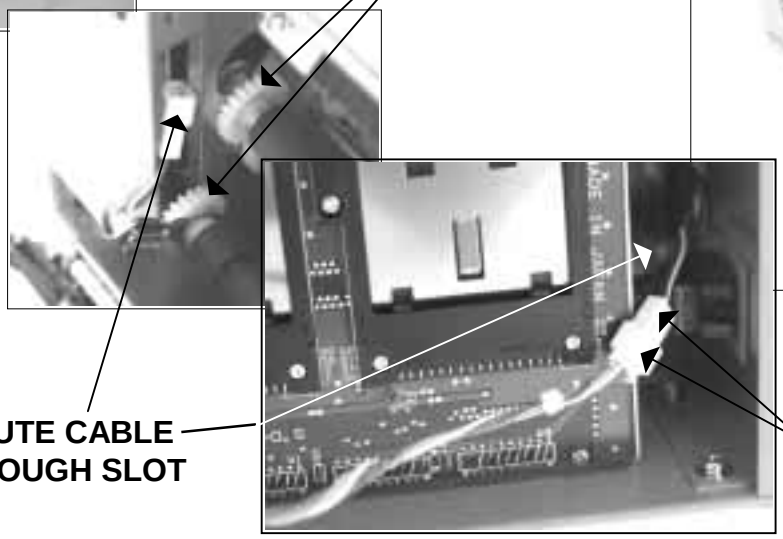


Fig. 9-7



ROUTE CABLE THROUGH SLOT

MATE CABLE FROM DISPENSER TO THE SOCKET. OBSERVE KEY OF CONNECTORS

Fig. 9-8

9-3 Label Dispenser Unit

Setup:

STEP	PROCEDURE
1.	Install the label dispenser as directed.
2.	Power on the printer.
3.	The printer must be configured to use the label dispenser option.
4.	Remove one or two lead labels from the backing paper.
5.	Open the label dispenser by lifting up its front panel and swinging open the unit such that the knurled roller is easily seen.
6.	Open the print head assembly and feed the lead of the backing paper through the print area in the normal manner.
7.	At the label exit area, feed the backing paper down and behind the knurled roller, then out the lower exit of the label dispenser.
8.	Close the front panel of the label dispenser until it locks into place and again is flush with the front of the printer.
9.	Close the print head assembly and place the printer on-line.
10.	The label dispenser is ready for use.

General Operation:

Send your data stream in the normal manner to the printer. Labels should print one at a time, even if your print quantity command requests more than one label. As labels are printed and presented for the operator to remove, the backing paper will continue to feed out the dispenser's lower exit path. If the dispenser's backfeed option has been set to TRIGGER in the printer configuration, the next label will print only after removing the current label from the label exit path. (You may also control the printing of the next label with an external device attached to printer's EXT connector. Contact a SATO representative for more information on this method.)

9-4 Label Rewinder

The Label Rewinder is an external unit that allows for labels or tags to be rewound in rolls up to 8.5 inches. It derives its power directly from the printer's EXT connector using a built-in cable. The rewinder provides the ability to rewind labels/tags from the printer and subsequently be unwound for later use with applicators.

Installation:

Required Equipment:	#2 Phillips Screw Driver

STEP	PROCEDURE
1.	Fasten the rewinder mounting plate to the bottom of the printer with (2) screws provided.
2.	Position the rewinder in the slots on the mounting plate at the front of the printer and align it with the label slot. The rewind wheel/spindle should be positioned away from the printer. Refer to ***Fig. 9-9.***
3.	Connect the built-in cable from the rewinder to the EXT connector at the rear of the printer. Refer to ***Fig. 9-10.***
4.	On the rewinder, remove the metal clamp from the rewind spindle.
5.	Feed the lead end of the label stock under the first spindle and onto the rewind spindle. Feed the label stock around the spindle once, then replace the metal clamp over the label stock. Wind another revolution to ensure the labels are secure on the spindle.
6.	Select the REWIND option on the rewinder, then set the power switch to ON. The printer must be powered on for the rewinder to function.

9-4 Label Rewinder

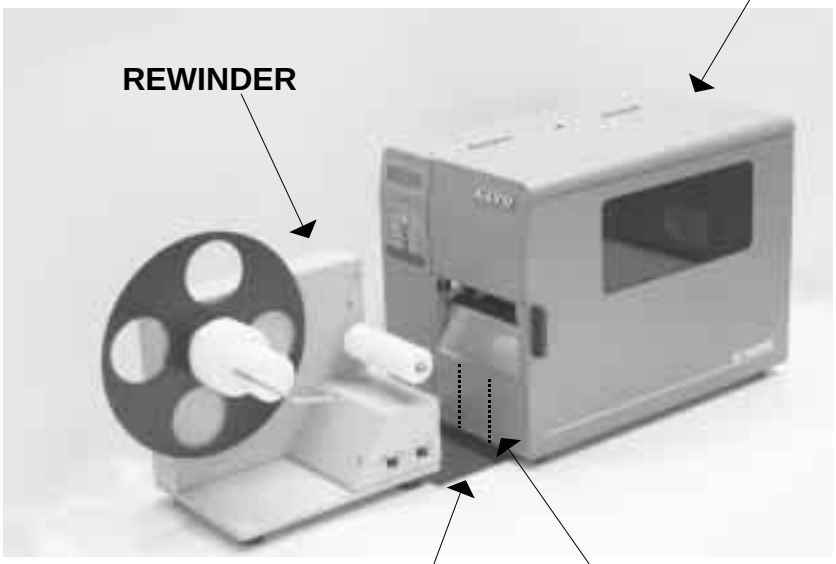


Fig. 9-9

Fig. 9-10

Removing and Unwinding the Roll

As labels are printed, tension from the rewinder should keep the label stock taut as it wraps onto the rewind spindle.

To remove the roll from the spindle, first set the power switch OFF. Remove the metal clamp, then remove the rewound roll of labels.

To unwind for using with an applicator, first set the power switch OFF. Attach the lead edge of the labels from the rewind spindle to the applicator entry point. Select the WIND option on the rewinder, and when ready to begin, set the power switch to ON.

9-5 Label Cutter Unit

The M-8402 label cutter automatically cuts each label after completion of the print operation using a motorized, rotary knife. As soon as the completed label has been cut, the label stock is backfed to the print position for proper alignment of the printed data on the succeeding label.

Installation:

Required Equipment:	#2 Phillips Screw Driver

STEP	PROCEDURE
1.	Switch the printer OFF but keep the power cable plugged in to discharge any possible static charges.
2.	Open the top and side access doors on the mechanical side of the printer.
3.	Loosen (2) inside screws holding the LH cover to the inside top of the printer and remove (2) screws holding the cover to the frame. Lift off the cover for access to the electrical section. Refer to ***Fig. 9-11, 9-12 & 9-13.***
4.	Remove the screw from the front hinge of the top cover for Step 9 below.
5.	Remove (1) screw holding the label tear off cover to the printer. Rotate the cover down, then remove it by lifting up. Refer to ***Fig. 9-14.***
6.	Move the print head lock lever to the open position. Refer to ***Fig. 9-15.***
7.	Remove (2) screws to detach spacer panel. Refer to ***Fig. 9-16***.
8.	Remove (4) screws holding the print mechanism to the back panel and (2) screws attached to the hinges. Refer to ***Fig. 9-16, 9-17 & 9-18.***
9.	Slide the print mechanism as far forward as it will go. It will cover the space left by the removal of the spacer panel, (Step 7).
10.	Replace (6) screws removed in Step 8.
11.	Attach two hinge halves to the front base of the printer. Refer to ***Fig. 9-19.***
12.	Install spacer panel. Refer to ***Fig. 9-20.***
13.	Reattach hinge removed in Step 4.

9-5 Label Cutter Unit

Installation cont.

STEP	PROCEDURE
14.	Pass the cable with the single grey connector, (attaches to the cutter) through the access hole in the print mechanism wall from the electrical side. Insert the connector into the socket identified as CUT on the circuit board of the cutter. Refer to ***Fig. 9-21.***
	WARNING: INCORRECT ORIENTATION OF THESE CONNECTORS WILL RESULT IN SEVERE DAMAGE TO THE PRINTER/CUTTER.
15.	Route and attach the connectors from the split cable to the sockets on the PCB. Refer to ***Fig. 9-22 9-23 & 9-24***.
	WARNING: INCORRECT ORIENTATION OF THIS CONNECTOR WILL RESULT IN SEVERE DAMAGE TO THE PRINTER/CUTTER.
16.	Mate the hinges on the cutter to those installed in Step 10. Carefully slide the cutter to the inside of the printer. (The cutters drive pulley's and belts extend into the opening in the inside of the printer.) Refer to ***Fig. 9-19.***
17.	Loosen (2) screws holding bracket on the cutter frame. Attach the bracket to the print mechanism using screw provided but do not tighten. Refer to ***Fig. 9-25.***
18.	Be sure all cables are properly routed. Close the door and lid and secure cover with screws removed in Step 3.
19.	Connect the AC power cord to the printer and place the power switch in the ON position. The installation of the Dispenser is now complete.

9-5 Label Cutter Unit

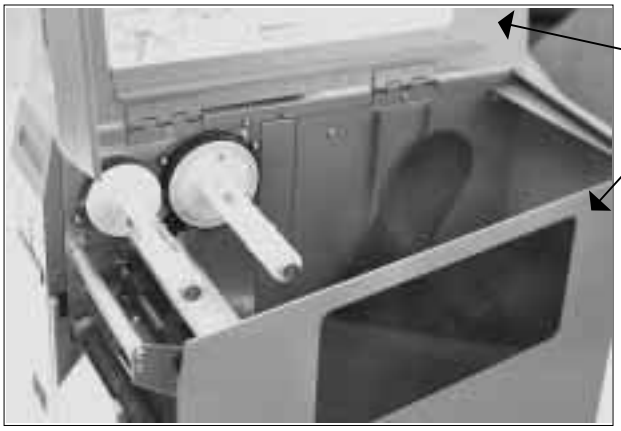


Fig. 9-11

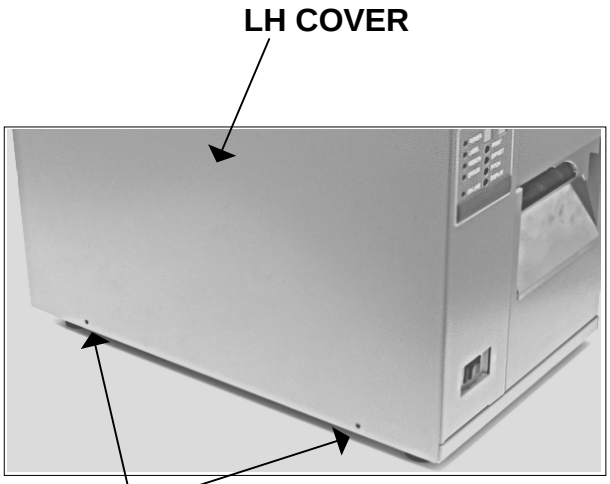


Fig. 9-13

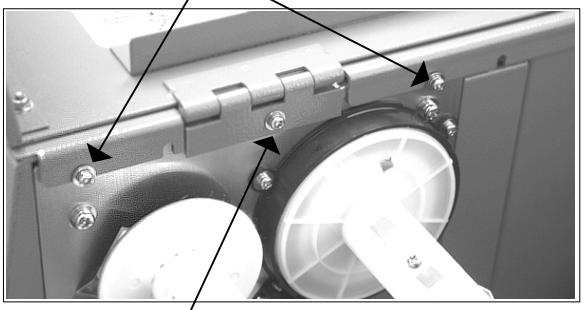


Fig. 9-12

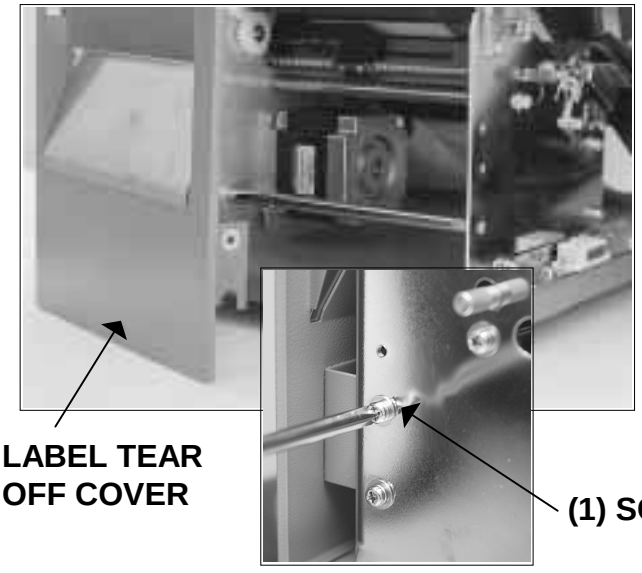


Fig. 9-14

Fig. 9-15

9-5 Label Cutter Unit

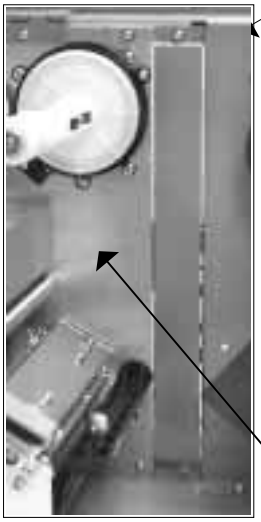


Fig. 9-16

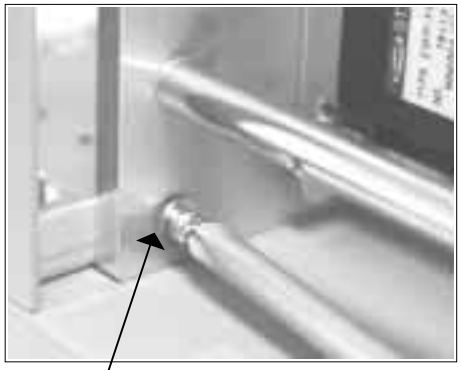


Fig. 9-17

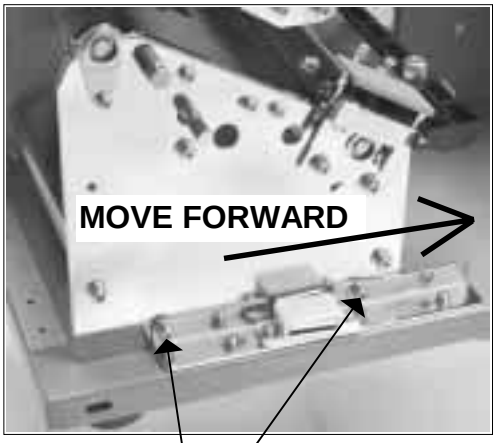


Fig. 9-18

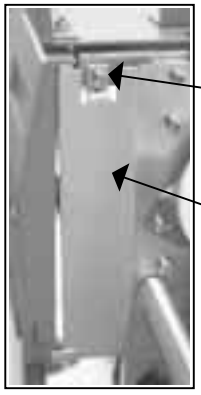


Fig. 9-20

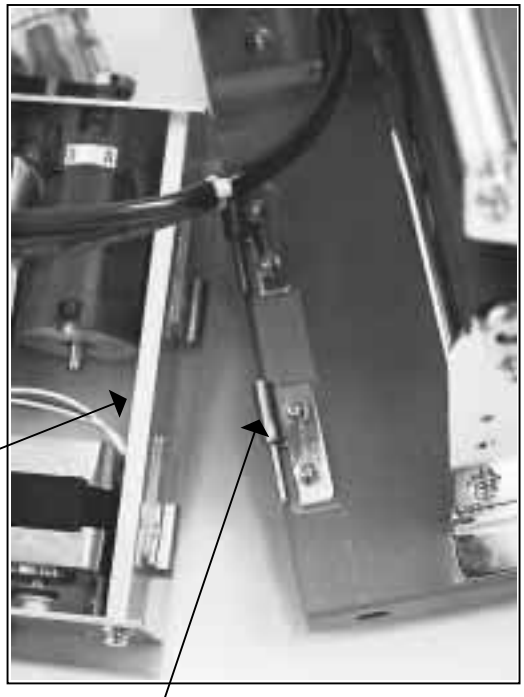
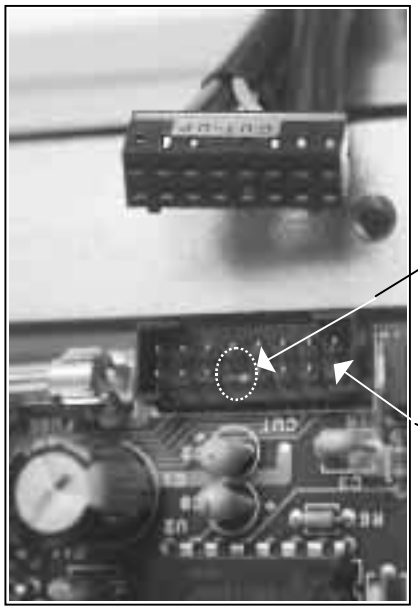


Fig. 9-19

9-5 Label Cutter Unit



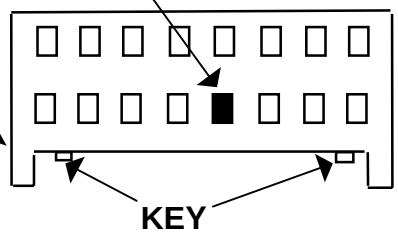


Fig. 9-21

GRAY PLUGGED HOLE AND MISSING PIN ON CUTTER PCB DETERMINE REQUIRED ORIENTATION. PLASTIC KEYS ON CABLE CONNECTOR HOUSING DO NOT PREVENT INCORRECT CONNECTION. HOWEVER, THE KEYS ARE ALSO PROVIDED AS AN ORIENTATION DEVICE AND MUST FACE DOWN WHEN CONNECTING CABLE TO CUTTER PCB.

CONNECTOR FROM PRINT MECHANISM

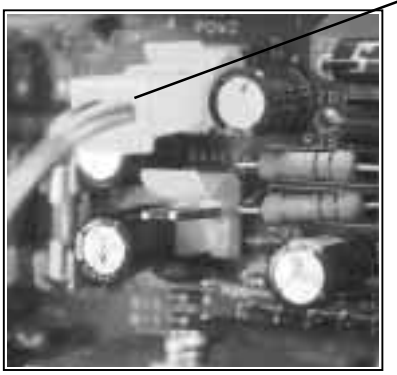
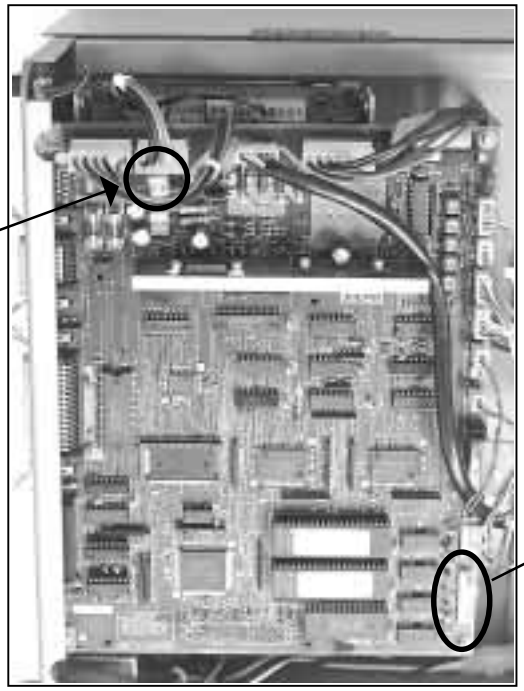


Fig. 9-22



MAIN PCB *Fig. 9-23*

CONNECTOR FROM PRINT MECHANISM

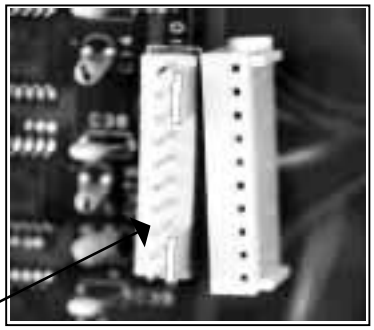


Fig. 9-24

9-5 Label Cutter Unit

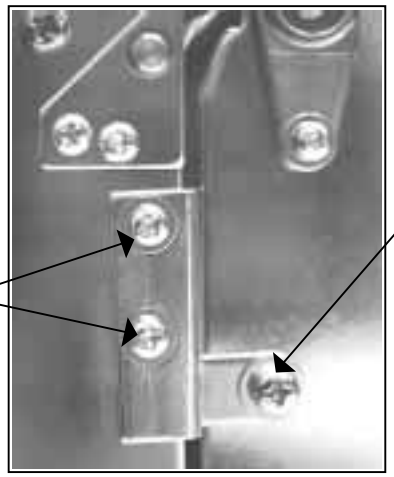


Fig. 9-25

9-6 Calendar

The Calendar Option allows the date and time to be maintained in the local printer rather than using the system clock. It consists of a special clock chip that replaces the EEPROM on the main PCB. A qualified technician should perform the upgrade as it requires modifications to the main PCB.

FOR THIS OPTION CONTACT FACTORY